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POPULAR MECHANICS MAGAZINE

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Popular Mechanics Magazine

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Address all communications to: 200 E. Ontario St., Chicago 11, Ill.

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Advertising Offices
Chicago: 200 E. Ontario St., Whitehall 4-0100;
New York: Empire State Bldg., 350 Fifth Ave.,
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Angeles: 3460 Wilshire, DUnkirk 2-8458; San
Francisco: Russ Bldg., 235 Montgomery St.,
Yukon 2-0823.

Published monthly by Popular Mechanics Company,
200 E. Ontario St., Chicago 11, Ill. H. H. Wind-
sor, Jr., president; Wm. Harrison Petridge, exec.
vice-pres.; Franklin S. Forsberg, operations vice-
pres.; D. F. Windsor, vice-president and secretary-
treasurer; H. H. Windsor III, vice-president; W. T.
Windsor, vice-president; Joseph R. Buell, Jr., ad-
vertising manager; Alan M. Deyoe, circulation
manager. Single copy in the United States and
Canada, 35 cents; subscription rates in the United
States and possessions, Canada and countries of the
Pan-American Postal Union, 1 year \$3.50; 2
years, \$6.00; 3 years, \$8.00. To all other coun-
tries add \$1.00 a year over United States prices for
overseas postage. If you plan to move, notify us
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Entered as Second Class Matter, September 15,
1903, at the Post Office at Chicago, Illinois, under
Act of March 3, 1879. Entered as Second Class
Matter at Post Office Dept., Canada. Registered
as Second Class Matter at the Post Office at
Mexico, D.F., Mexico, June 20, 1950.
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FOREIGN EDITIONS:	MECANIQUE POPULAIRE (French)	MECANICA POPULAR (Spanish)	POPULAER MEKANIK (Danish)	POPULAR MEKANIK (Swedish)	POPULARE MECHANIK (German)
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Next Month...

WHY THESE TRAGIC AIR COLLISIONS? PM went to presidential adviser, General Quesada, for an interview in the December issue on "What We're Doing About Air Safety." . . . Next month, too, you'll see the new small Studebaker. . . Houdini and Thurston are gone, but their magic lives on. America's foremost authority on magic today, Christopher, reveals in December his choice of the "Greatest Illusions of All Time," with full color illustrations.

POPULAR MECHANICS



How we retired in 15 years with \$300 a month

"Strange, I remember it so clearly—and more than 15 years seems just a short while ago. For it's only thanks to what happened Christmas 1941 that we're living in Florida today, with our income guaranteed for life.

"That holiday afternoon we'd invited some people in, and as we waited, Dot and I sat by the living-room fire reading. Christmas always made me kind of stop and take stock, I guess. And *this* year I was turning forty. *I'm not getting any younger*, I thought, as I leafed through Life magazine.

"For years we'd cherished a favorite dream, Dot and I. Someday I was going to retire. We'd sell the house and move to Florida. Get just a *little* place where we'd be out in the sun all year. We'd get off the treadmill and have time for living.

"But we'd stopped talking about it lately. For we hadn't banked much money. At almost forty, nearly half my working

life was behind me. So I began to wonder that afternoon . . . *Must I just live and work and die . . . doing the same thing every day?*

"It was what I was thinking, I suppose, that made me notice the page that said, 'You don't have to be rich to retire on an income.' I read it through. There *was*, it said, a way for an ordinary salaried man to get a lifetime income and retire. The Plan was called the Phoenix Mutual Retirement Income Plan. With it, I could get a guaranteed income of \$300 a month beginning when I reached 55. To do it, I needed only one thing—fifteen or twenty good earning years ahead. I'll look into it, I decided, cutting out the coupon.

"Soon my mail brought a booklet telling about Phoenix Mutual Plans. Yes, one was just right for me.

"Looking back, 1941 seems like yesterday. We saw the war come and go with all its worries.

Again and again I was thankful we had our Phoenix Mutual Plan.

"Well, Christmas 1956 rolled around—and we had a party. I was almost 55 and set to retire. Soon after, my first Phoenix Mutual check for \$300 arrived. We got a good price for our house, packed, and drove to Florida.

"We found just the little house we had dreamed of. And month after month the postman hands us our pay check. We're financially independent, and will be *for life*."

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This story is typical. Assuming you begin at a young enough age, you can plan to have an income of \$100 to \$300 a month or more—starting at age 55, 60, 65 or older. Send the coupon and receive, by mail and without charge, a booklet which tells about Phoenix Mutual Plans. Similar plans are available for women. Don't put it off. Send for your copy now.

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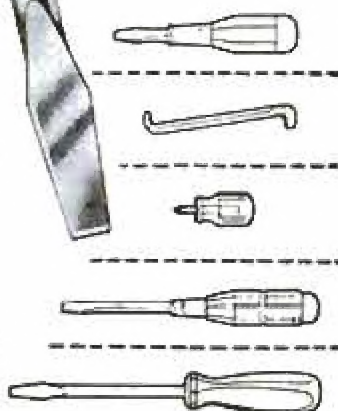
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ACROSS THE DESK



To the Editor:

Reading your caption "These Rocketeers Play Safe" in the September 1958 issue of *Popular Mechanics*, there is no doubt Joseph E. Brown is referring to the safe handling of rockets.

As an employee of a Telephone Company, trained in safety practices (in this case) on the proper use and handling of extension ladders, I shudder to think of the disciplinary action a company supervisor would take if a ladder as shown in this picture was used by one of his subordinates.



Under no circumstances shall a ladder be used with a side rail cracked or broken; and a ladder of sufficient length shall be such that the work can be performed when standing not higher than on the fourth rung from the top.

Footing and angle of ladder could not be determined from this photograph, however I feel I would be remiss in my duties if I neglected to comment on this photograph.

I must add I enjoy reading *Popular Mechanics*, and this is constructive criticism only.

W. A. McDermid,
Cooksville, Ontario, Can.

(Continued to page 10)

WHAT HAPPENS WHEN A MAN DECIDES TO DO SOMETHING! ABOUT HIS FUTURE!

The proven rule of "learn more to earn more" took M.E.F. (name on request) from a position of truck driver to that of an accounting executive in sixteen months. Listen to what M.E.F. says:

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M.E.F. took a proved road to success—and his letter is typical of the thousands we have in our files from men and women in all walks of life.

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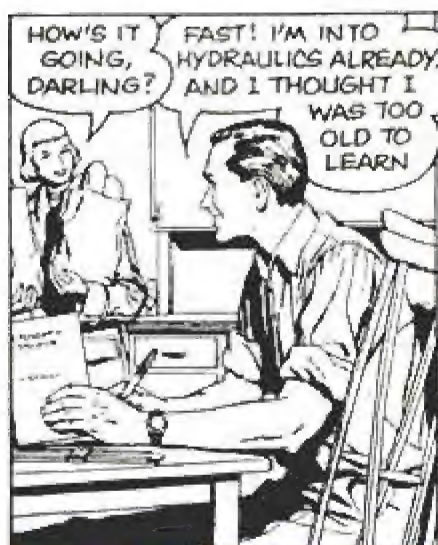
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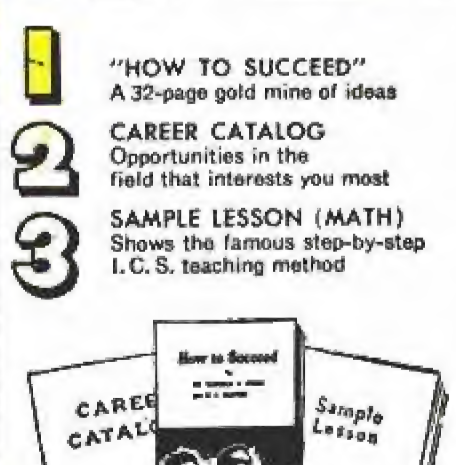
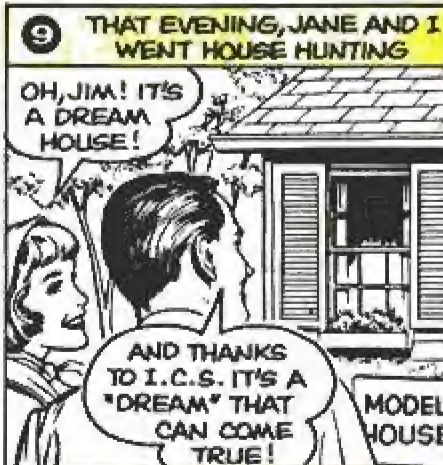
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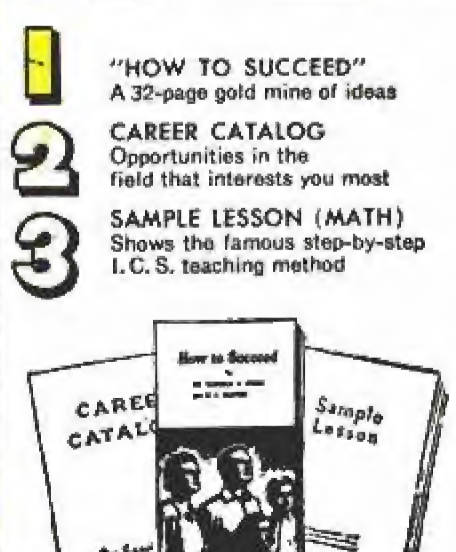
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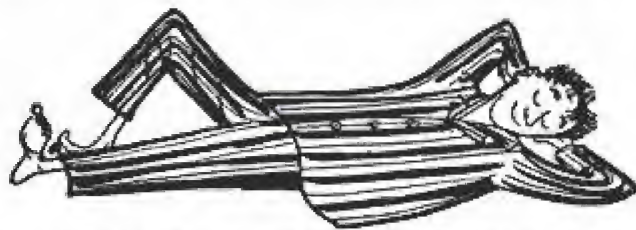
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(Continued from page 6)

To the Editor:

We have noted with interest the photographs appearing on page 114 of your August 1958 issue, of a boat constructed by welding two 1948 auto hoods together.

I recently examined a similar boat that had been constructed by welding together two 1947-48 Hudson hoods, and powered by a two-horsepower inboard Marine engine. The examination was made following recovery of the boat after it had sunk in

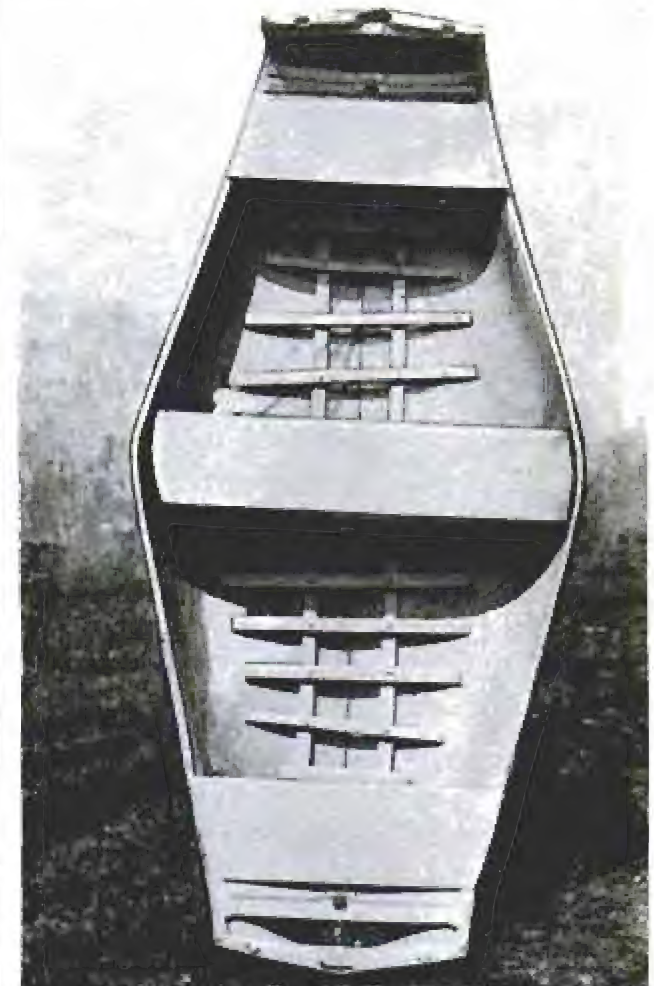


Photo of boat built of auto hoods, reprinted from August issue, inspired letter of safety man Daughtrey

approximately 30 feet of water and its operator drowned.

Investigation of the accident disclosed that the operator was accompanied by three children weighing an estimated total of 145 pounds making a total live-weight load of 310 pounds and reducing the free-board to less than four inches along the gunwales. Witnesses stated that the children leaned over the side, causing the boat to ship water toward the bow. The bow immediately went under and the boat sank. The youngsters, wearing life jackets, were rescued. The operator did not have this protection and drowned in attempting

(Continued to page 12)



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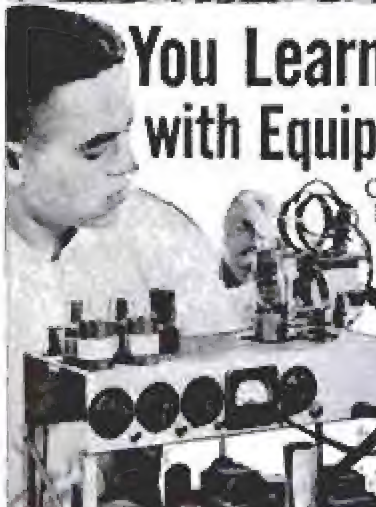
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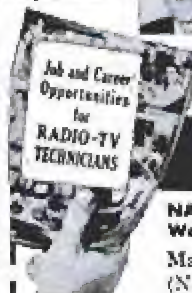


"I have my own Radio-TV business and my income has provided me with financial security. Business is great. I can't keep up with the work."—**EDWARD M. DUDEK, Chicago, Ill.**

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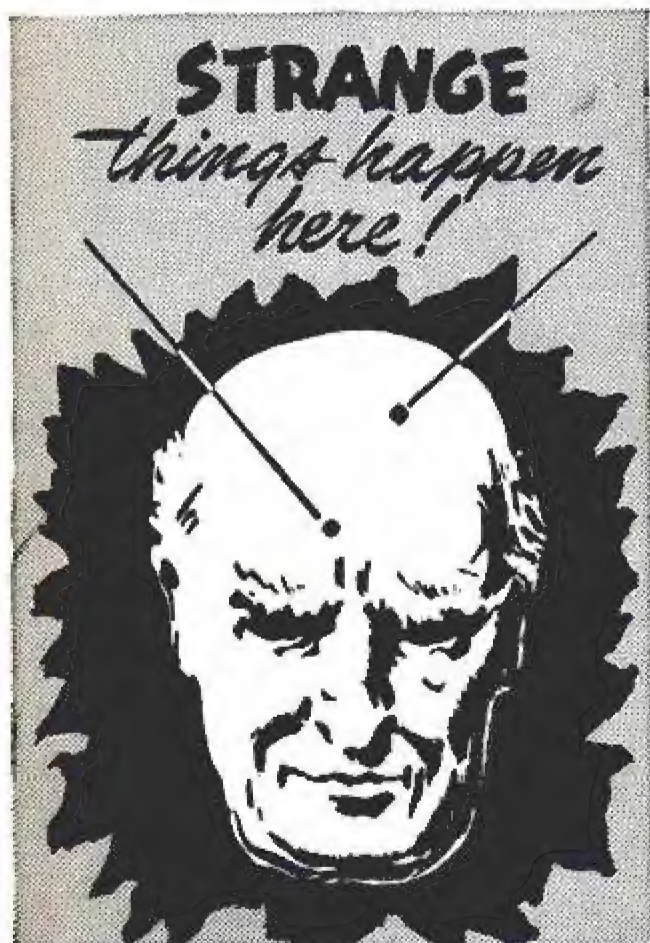
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The ROSICRUCIANS

San Jose (AMORC) California

(Continued from page 10)

to get the youngsters to shore. The accident occurred in a quiet cove and in calm water.

Causes of the accident are believed to have been possible overload, limited freeboard, and lack of sealed buoyancy chambers or buoyant material capable of assuring flotation of boat and passengers. Since the boat shown in the photograph in your magazine apparently does not have sealed air chambers or buoyant material, we thought you might be interested in our accident, particularly since use of your boat for duck hunting will very likely result in someone's standing in the boat to shoot, and probably other movement without regard for the hazard involved.

Wm. W. Daughtrey,
Safety Director,
Fort Gordon, Va.

☆ ☆ ☆

To the Editor:

We have read with interest "Boston Sees the Stars in Hi-Fi" in the September issue of your magazine.

The article begins with the statement that the old Zeiss optical plant, which built the projectors in most of the world's great planetaria, is "serving the Russians." Paragraph 6 contains the phrase: "Rather than go behind the Iron Curtain to purchase a Zeiss machine . . ."

These statements are incorrect and detrimental to the interest of Carl Zeiss, evacuated to West Germany by the American Army before the city of Jena was turned over to the Russians. Since then Carl Zeiss has been located in Oberkochen, Württemberg, West Germany. There a new plant is in operation employing over 5000 people, under the direction of the old management, and with the help of many scientists, engineers, and workers formerly employed at the Jena works. The creator of the planetarium idea and inventor of the Zeiss Planetarium, Professor Dr. Walther Bauersfeld, having celebrated his 50th year with Carl Zeiss, is still one of the directors of the firm in West Germany.

At Oberkochen, the Zeiss planetarium instrument has been further developed, and a new model has been constructed which incorporates numerous technical improvements and amplifications. One of the improvements over the prewar Zeiss instrument is the use of 42 special projectors for the 42 brightest stars.

Four modern Zeiss planetarium instruments, manufactured in West Germany, have in recent years been installed, i.e., in

(Continued to page 18)

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

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A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY JACOBSON

Registered Patent Attorneys

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U.S. Forest Service photo

Do You Know This Old-Timer?

This bit of ancient history was captured on film somewhere in the Bighorn National Forest in Wyoming. Subject: a forest ranger at work, 1919. Magnificent country—and a magnificent

car, in its day. Most old-timers, looking at the radiator cap, will think it's a Ford; but is it? Obviously someone has taken liberties with its body. One guess—then turn to page 250.

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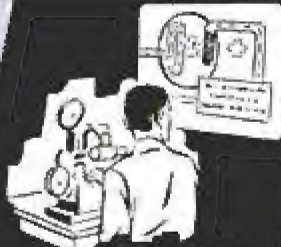
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If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

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(Continued from page 12)

Sao Paulo, Hamburg, Tokyo and London. During the current year new West German Zeiss planetaria are being erected in Johannesburg and in Caracas.

W. Schlipp,
Carl Zeiss, Inc.,
New York City.

☆☆☆

To the Editor:

I was much interested in your article in the August *Popular Mechanics*, ("Miracles Ahead on Your Telephone") because for a long time I have been trying to persuade telephone companies to work out and install what in my opinion is the most needed improvement in telephones it is possible to imagine, but all I get is a lot of scientific gobbledygook!

The improvement would be this: install a small signal bulb on the receiver that lights up while you are talking and pulsates intermittently whenever some one is trying to get you on the line—a busy signal that you can see!

There would be no sound, and you would not be interfered with in your conversation, but you would know that some one was trying to get you, and you could use your own judgment as to whether you wanted to end your conversation and switch yourself onto the "invader" or ignore him.

Give this a little thought and I am sure you will see many valuable uses for this device. Most valuable one, probably, is when you are trying to get your residence from the office and get a never-ending "busy." Your wife, or whoever is causing the jam, will have a pointed urge to switch over—to "accommodate" you or, more likely, not to miss some scuttlebutt from some friend of hers. At any rate, it would induce the long-winded to cut it short as someone is trying to get on the line.

Claude Schaffner,
New Haven, Conn.

☆☆☆

Our Apologies

The names of Mr. and Mrs. Henry Myers of 3695 Denair St., Pasadena, Calif., and Mr. Welden Allen of 3685 Denair St., Pasadena, Calif., were inadvertently omitted from the article entitled "Animated Christmas Displays" starting on page 177 of this issue. We wish to express our thanks to Mr. and Mrs. Myers for permission to picture and describe the novel and unusual display shown on page 178 and the very attractive display on page 180. Our thanks go to Mr. Allen for the parachuting Santa Claus display pictured on page 179.

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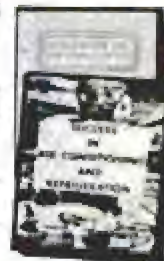
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Sign, date and have this invention disclosure witnessed by two people capable of understanding your invention.

Have us make a preliminary search among U. S. patents already granted for similar types of invention.

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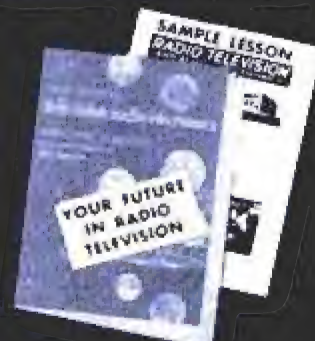
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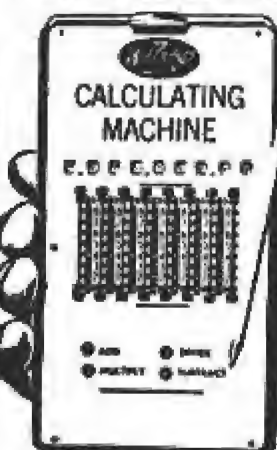
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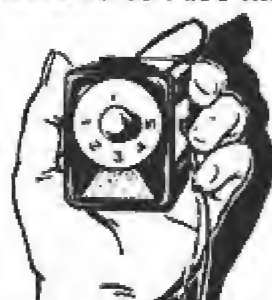
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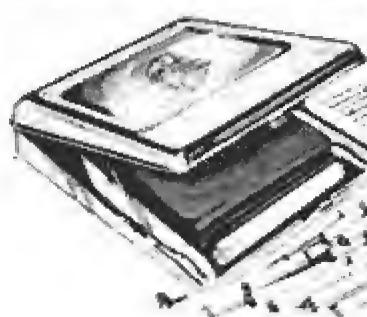
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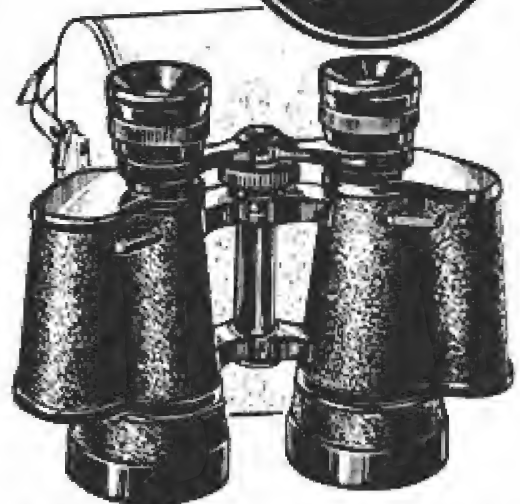
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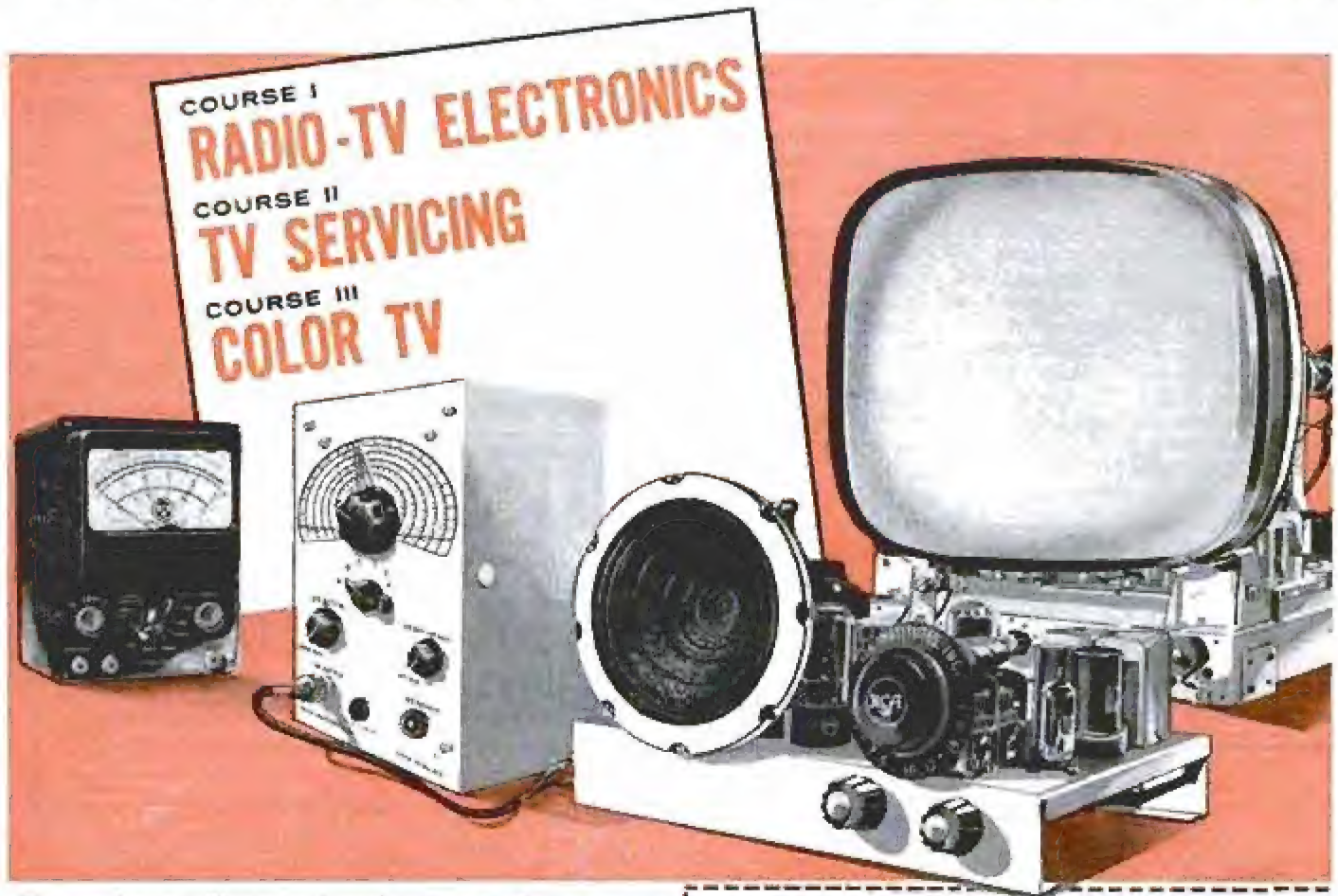
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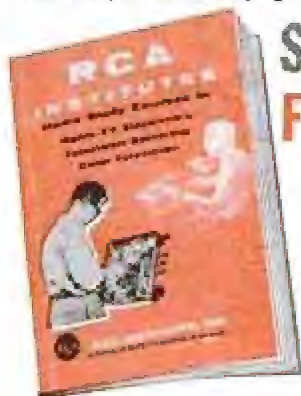
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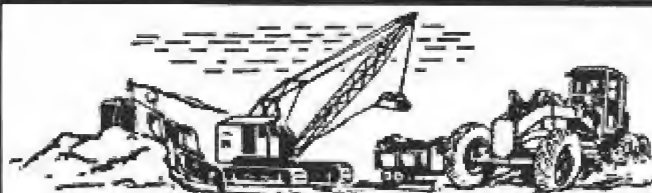
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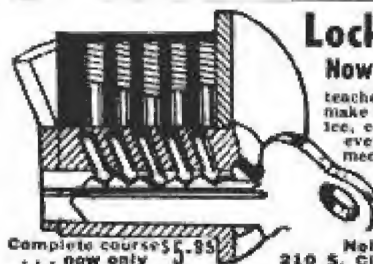
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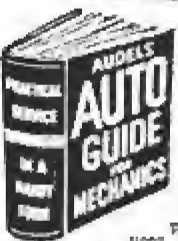
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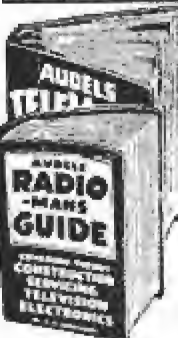
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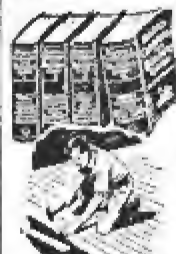
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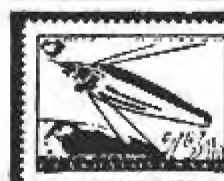
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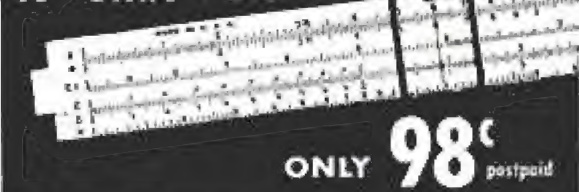


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I am printing my message in a magazine. It may come to the attention of thousands of eyes. But of all those thousands, only a few will have the vision to understand. Many may read; but of a thousand only you may have the intuition, the sensitivity, to understand that what I am writing may be intended for you—may be the tide that shapes your destiny, which, taken at the crest, carries you to levels of independence beyond the dreams of avarice.

Don't misunderstand me. There is no mysticism in this. I am not speaking of occult things; of innumerable laws of nature that will sweep you to success without effort on your part. That sort of talk is *rubbish*! And anyone who tries to tell you that you can *think* your way to riches without effort is a false friend. I am too much of a realist for that. And I hope you are.

I hope you are the kind of man—if you have read this far—who knows that anything worthwhile has to be *earned*! I hope you have learned that there is no reward without effort. If you have learned this, then you may be ready to take the next step in the development of your karma—you may be ready to learn and use the secret I have to impart.

I Have All The Money I Need

In my own life I have gone beyond the need of money. I have it. I have gone beyond the need of gain. I have two businesses that pay me an income well above any amount I have need for. And, in addition, I have the satisfaction—the deep satisfaction—of knowing that I have put more than three hundred other men in businesses of their own. Since I have no need for money, the greatest satisfaction I get from life, is sharing my secret of personal independence with others—seeing them achieve the same heights of happiness that have come into my own life.

Please don't misunderstand this statement. I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept

something for nothing. I have never met a highly successful man whom the world respected who did not sacrifice something to gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "leg up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot—but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to sacrifice something to get it.

A Fascinating and Peculiar Business

I have a business that is peculiar—one of my businesses. The unusual thing about it is that it is needed in every little community throughout this country. But it is a business that will never be invaded by the "big fellows". It has to be handled on a local basis. No giant octopus can ever gobble up the whole thing. No big combine is ever going to destroy it. It is essentially a "one man" business that can be operated without outside help. It is a business that is good summer and winter. It is a business that is growing each year. And, it is a business that can be started on an investment so small that it is within the reach of anyone who has a television set. But it has nothing to do with television.

This business has another peculiarity. It can be started at home in spare time. No risk to present job. No risk to present income. And no need to let anyone else know you are "on your own". It can be run as a spare time business for extra money. Or, as it grows to the point where it is paying more than your present salary, it can be expanded into a full time business—overnight. It can give you a sense of personal independence that will free you forever from the fear of lay-off, loss of job, depressions, or economic reverses.

Are You Mechanically Inclined?

While the operation of this business is partly automatic, it won't run itself. If you are to use it as a stepping stone to independence, you must be able to work with your hands, use such tools as hammer and screw driver, and enjoy getting into a pair of blue jeans and rolling up your sleeves. But two hours a day of manual work will keep your "factory" running 24 hours turn-

ing out a product that has a steady and ready sale in every community. A half dollar spent for raw materials can bring you six dollars in cash—six times a day.

In this message I'm not going to try to tell you the entire story. There is not enough space on this page. And, I am not going to ask you to spend a penny now to learn the secret. I'll send you all the information, free. If you are interested in becoming independent, in becoming your own boss, in knowing the sweet fruits of success as I know them, send me your name. That's all. Just your name. I won't ask you for a penny. I'll send you all the information about one of the most fascinating businesses you can imagine. With these facts, you will make your own investigation. You will check up on conditions in your neighborhood. You will weigh and analyze the whole proposition. Then, and then only, if you decide to take the next step, I'll allow you to invest \$15.00. And even then, if you decide that your fifteen dollars has been badly invested I'll return it to you. Don't hesitate to send your name. I have no salesmen. I will merely write you a long letter and send you complete facts about the business I have found to be so successful. After that, you make the decisions.

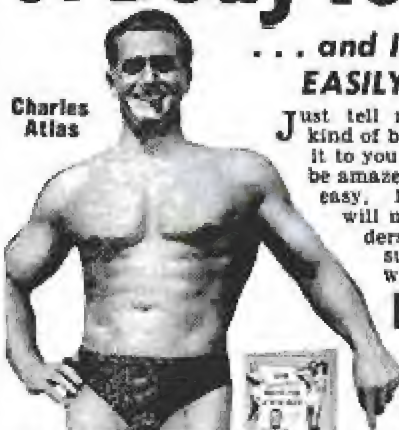
Does Happiness Hang on Your Decision?

Don't put this off. It may be a coincidence that you are reading these words right now. Or, it may be a matter that is more deeply connected with your destiny than either of us can say. There is only one thing certain: If you have read this far you are interested in the kind of independence I enjoy. And if that is true, then you must take the next step. No coupon on this advertisement. If you don't think enough of your future happiness and prosperity to write your name on a postcard and mail it to me, forget the whole thing. But if you think there is a destiny that shapes men's lives, send your name now. What I send you may convince you of the truth of this proverb. And what I send you will not cost a penny, now or at any other time.

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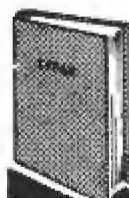
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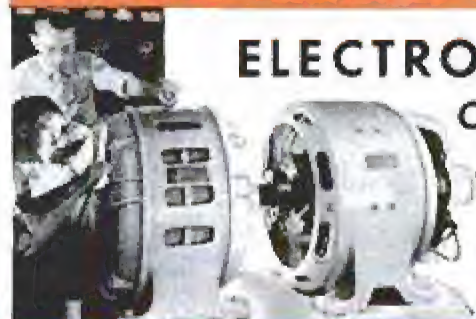
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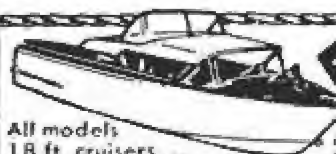
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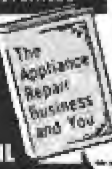
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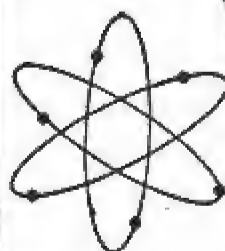
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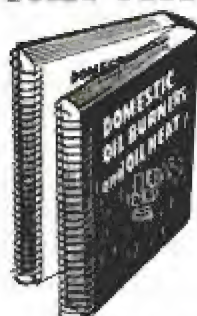
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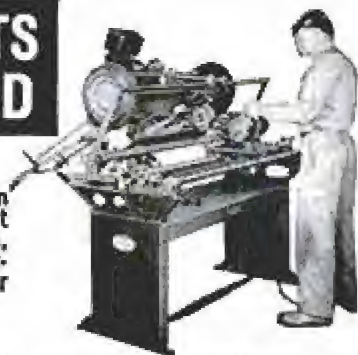
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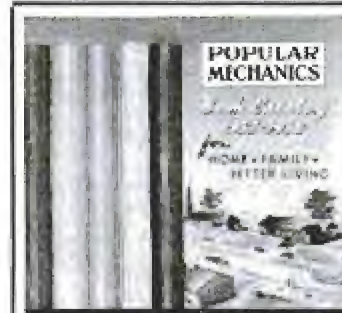
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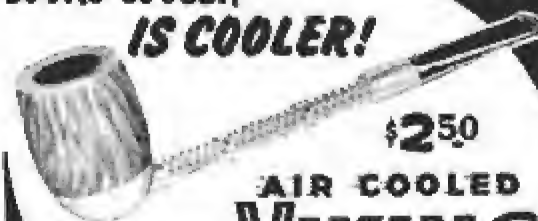
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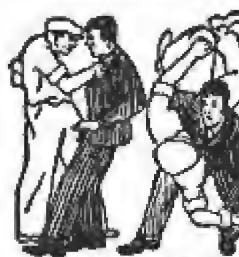
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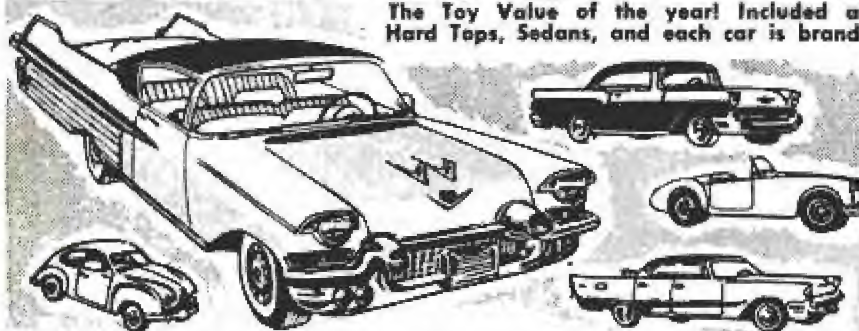
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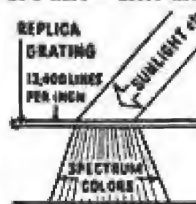
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"HOW To Build Your Own Mail Order Business." Get the facts! Informative booklet, 25¢. Satisfaction guaranteed. Mail Order Publications, 5204 37th Street North, St. Petersburg 33, Florida.

EARTHWORMS Bring dollars! Illustrated booklet, 35¢. Literature free. Publisher Cutler, Reading, Pennsylvania.

OPERATE Mailorder folio business. Free details. Ballard's, 1323 Winter, Louisville 4, Ky.

MOTEL Supplies mailorder business. Full setup service. Hermes Advertising, 152-C West 42, New York City 36.

TREMENDOUS Possibilities in home mail order. I retired after five years. Plan and help given absolutely free. Norris Cole, 217 West 49th, Bradenton, Florida.

MAKE Money growing orchids at home. Inexpensive to start. Full details free. Beatrice Makransky, Box 1776P, Miami 10, Fla.

WANTED: Home producers, to be subcontractors. Cast plastic products for manufacturers in our clearing house service. Thousands of easily made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 11-PM, East Boston 28, Massachusetts.

FREE Document "Business Goldmine." Get free national advertising of your product or service. Profits unlimited. Write: Di-Carr Publicity, 1525 S. 48th Court, Cicero 50, Illinois.

MAKE A good living sharpening saws and lawnmowers. Thousands of our machines in use. Free literature. Max Manufacturing Co., 138 Stockton Ave., San Jose, Calif.

INCOME With garden golf. Motivated archery ranges. Brockway, Box 3924, Portland 8, Oregon.

YOUR Own high profit business. Sell name brands, full or part time. No inventory, no investment. More than 2,000 name brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi radios, phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 floors of name brands. Million dollar inventory. Orders shipped complete within 24 hours! Send for free, beautifully illustrated catalog now! Separate dealer price list. H. B. Davis Corp., Dept. 11, 145 W. 15 St., New York 11, N. Y.

"50 NEW Home-Business Ideas" booklet. Sample free. Spray exotic Velvet-Suede on anything. Plockcraft-NR, Los Angeles 81.

YOU'LL Make money making cases at home because we help you sell. Build luggage and cases for 1001 needs. We supply instructions, supplies, everything! Work full, sparetime. Details free. Abarsl, 807-S11 Sunset Blvd., Los Angeles 12, Calif.

HOME-Import mail order business—Import profitable items below wholesale. Experience and product investment unnecessary. Full, spare time. Famous world trader guides you. Free list "157 Imports," details. Mellinger P70B, Los Angeles 24.

GROW A living miniature forest or orchard (only inches high) that bears tasty tiny fruit at home. Learn amazing dwarfing secrets! Fascinating hobby. Profitable home-business opportunity. Free seeds and plan. (State your age.) Miniature Nurseries, Dept. NR, Gardena, California.

START Your own business on credit (U.S. and Canada). Be your own boss. 1425 dealers sold \$5,000 to \$32,000 in 1957. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. K-U-PPM, Freeport, Ill.

BOOKKEEPERS, Accountants. Operate a bookkeeping service. Part or full time. Amazing simplified system. Wonderful money-making opportunities. Complete information free. National Bookkeeping Publishing Co., Suite 307, 3435 Broadway, Kansas City 11, Mo.

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PROFITABLE Operative mail order business. Write! Heritage, 210-PM11 Fifth Avenue, New York 10, N. Y.

LET Us put you into business! We supply product, plan, advertising. You employ salesmen. Terrific profits! Repeats! Private labels! VitaMins, 4801A Cedardale, Wichita 10, Kansas.

SELL The Hertel Blue Ribbon pictorial Bible containing all the features necessary for complete Bible information. 1958 edition, top commission. International Book Co., 322 N. Market, Wichita 1, Kansas.

THE All profit offer plus my big mail 25¢. Satisfaction guaranteed! Crews, Box 53, Valrico, Florida.

GROW Expensive herbs for us! Big profits home-business of your own. Year around profitability! We supply everything necessary! Send for free rare seeds and revealing plan. (State your age.) National Herb Exchange, Dept. NR, Gardena, Calif.

CLEANS Windows without mess. Strange dry cleaning-cloth. Replaces liquids. Windows gleam. Samples sent on trial. Kristee 103, Akron, Ohio.

AUTOMOTIVE Accessories—300% profit. Steiner, 156TB West 86, New York 24, New York.

MEN, Women—Big paying, mail operated, national collection agency. Confidential homework system \$1.00. Interstate, 37 Besch, Albany 9, New York.

LEARN Enjoyable hobby-business engraving plastics! New "Dupliscalex," engraving attachment, uncovers countless profitibilities! Details, sample 10¢. Desco Distr's., 5262-V Van Nuys, Van Nuys, Calif.

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OPERATE Profitable mailorder business. Write Rocky Service, 6740 Waterworks Rd., Norfolk 2, Virginia.

"HOW To Conduct a Profitable Mail Order Business" folio, 25¢. Buy merchandise below wholesale. Catalog 25¢ (refundable). Martin's Service, 742-D Francisco Blvd., San Rafael, Calif.

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\$250 WEEK Cleaning venetian blinds. Patented machinery. Free literature. Robinson, 7213B Indianapolis 1, Indiana.

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COSTS 8¢—Retail \$1.00. Needed automotive product. You manufacture, distribute, easily. Everything furnished. Wilson, 505-B, Princeton, W. Va.

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AMAZING Mailorder business opportunity! Tremendous profits! National, 2896 So. 10th, Fresno 25, Calif.

BE Appointed state notary public. Write Notary Publics', 3230-MB, Stoner, Los Angeles 66, Calif.

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SELL Books by mail. 400% profit. Royal, Box 268-X, Cleveland 27, Ohio.

REBUILD Batteries; repair dolls; make rubber stamps. "75 Ideas" free. Universal, Box 1078-A, Peoria, Ill.

CASH From sawdust, tin-cans, newspapers. Over 200 methods. Instructions \$1.00. Charles Company, 12-XAT, Norwood, Ohio.

CHRISTMAS Offering of imported gifts, shipped direct to you. Quality imports afford wonderful profit-making opportunities. Also, nationally manufactured merchandise at large discounts. Merchandise sold on approval. Request literature. K.T.C., P.O. Box 455, Bryn Mawr Branch, Seattle 88, Wash.

\$300-\$600 PROFIT Per month. Coin-operated laundry business that runs itself. Factual report, only \$1.00. Satisfaction guaranteed. Laundries, Inc., P.O. Box 366, Ardmore, Oklahoma.

OPERATE Your own home mail order business, it's profitable. Write. Webb Imports, Pico Rivera, Calif.

WE Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 27,000 customers. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Wash.

\$5,000 YEARLY. Spare time at home. Nothing to buy. No local selling. Dignified. Guaranteed. Home Harvest, 1933 Lakeview Road S.W., Albuquerque, N. Mex.

MAILORDER Envelope business. No investment. Omaha Envelope, 4721-E California, Omaha 32, Nebr.

BEAUTIFUL Oriental silk-paintings 13" x16". Best sellers at \$4.95. Sample \$2.95. Dox. \$29.00. Armin Lehmann, 45 Christopher, New York 14, New York.

BOOMING Business. Ground floor opportunity. Free booklet. Stone-Craft, Box 856-A, St. Louis, Mo.

MAKE Signs. Just nail on. Hoag's Sign Letters, 507 E. Chicago Blvd., Tecumseh, Michigan.

NOTICE—Mail order experts invite you to share their "know-how." Start your own successful mail order business. Experience unnecessary. Send \$1 for valuable detailed brochure. Richton Company, 157A, Maplewood, New Jersey.

MONEYMAKING OPPORTUNITIES

FREE Plan and help. Home mail order. A. Cole, 217 West 49th, Bradenton, Florida.

EASY Cash from odd items. Free details. Stark, Box 9897, Houston 15, Texas.

ELEVEN Ways to earn at home, no selling, free details. Sanders Company, 1762 Euclid, Lincoln, Nebr.

STEREO High fidelity. Be a home sales dealer. Big profits. Write Dept. HSD, Dynamic Electronics, Box 188, Forest Hills, N. Y.

FUNMAKERS. Gadgets. Wholesale catalog free. Exciting samples 25¢. Dohn-GD-Marks, Broadview, Ill.

FREE. Money-making plans. Work home. Zinke Publishers, 39, Savoy, Illinois.

START Successful home mail order business. Plan and personal help absolutely free. Johns, Box 1013, North Little Rock, Arkansas.

SELL Titania gems. Far more brilliant than diamonds. Catalog 10¢. Diamondite, 2420-M 77th, Oakland 5, California.

WE Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 25,000 customers. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Wash.

MEN—Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.50. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-2-L, 1512 Jarvis, Chicago 26, Ill.

SELL Magic mixing balls (49¢ value) \$3.00 dozen postpaid. BJ&R Sales Company, Box 9206, Tulsa, Oklahoma.

SCHOOL Seniors—Make money. Sell classmates aptitude testing. Commissions, bonus. Details free. Guidance Associates, 115 Haypath Road, Plainview 1, New York.

SELL Information by mail. 10-to-1 profit ratio. Valuable suggestions free. Rawson P. Wood, 3974 Milwaukee, Chicago 41.

MAKE Money writing short paragraphs! No tedious study. I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-27-X, 7464 Clark, Chicago 26.

START Big-pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-2-L, Chicago 26, Ill.

EARN Money evenings copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

MUSHROOMS Quicker, easier, cheaper. Newest facts free. Spawna \$1.00. Luxur, 641 South 19th, Newark 3, N. J.

EASY To start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-2-L, Chicago 26.

MANAGING Money-raising campaigns for churches, hospitals, institutions; pays unusual fees. Short spare time course backed by 35 years experience. John Arbogast, 229 East Mason Avenue, Alexandria, Virginia.

\$50.00 WEEKLY Possible mailing merchandise catalogs. Roe, 1857P Gregory, Chicago 40, Ill.

\$36-\$200 WEEKLY. Plating baby shoes, making jewelry, novelties, etc. at home. Details free. JO-Ca Electroplater, 7840-D Northwest Sixth Court, Miami 50, Florida.

\$5,000.00 ANNUALLY Possible for you in mailorder. Free information. Ransie, Box 1719-A, Richmond 14, Virginia.

WANT To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6260 Broadway, Chicago 40, Illinois.

AMAZING Successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, 333 North Michigan, Chicago 1.

FREE Particulars and proofs from our many customers who are making money with our brush plating outfit that requires no tanks and formulas for silvering mirrors of all kinds, metal and wood finishes, silver plate and polish and 50 other money making formulas. Write today. Gun Metal Co., Ave. H, Decatur, Illinois.

BIO Profits quick! Make and sell costume jewelry. Details free! Modern Craft, Box 11088-M, St. Petersburg 33, Florida.

\$15,000 PROFIT In one year possible, on \$5.00 weekly. Fabulous but true. Minimum of attention, respectable field. 15% profit can be guaranteed. Experience unnecessary. Proof, complete detailed plan, only \$1.00. Satisfaction or refund. Columbia Enterprises, 8203-P, Grubb Road, Silver Spring, Maryland.

BUY Wholesale! 30-80% discounts! Nationally famous brands. Typewriters, housewares, appliances, watches, furniture, musical instruments, cameras, tools, etc. Consolidated Distributors, Clifton 2, New Jersey.

BOOKS: Hundreds of subjects. Big 1958 book catalog—10¢. Popular Mechanics Press, 200-BC East Ontario St., Chicago 11.

\$100.00 WEEKLY. Raise redworms solitaire way. Charlie Morgan, Bushnell, Fla.

WIN Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests, rules. Sample magazine 25¢. General Contests, 1609 1/2 East 5th, Duluth 12, Minnesota.

MAKE \$200.00 Monthly spare time with jigsaw. Free details. Elkman, 346F North Summit, Sioux Falls, South Dakota.

MAKE Money, operating mail order business, selling business cards. Vocacek Printing, 4444A Ute, San Diego 17, Calif.

CIGARETTES—Improved roller makes 20 for 9¢. Facts free. Moberly, Box 821, Owensboro, Kentucky.

FREE Folio "55,000-\$45,000, Unlimited Vacations." No merchandise. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

READ Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

BIG Money raising, fishworms and crickets. Free literature. Carter Hatchery, Plains, Georgia.

NEW Magazine shows you how to make mailorder pay. Free details. Mailorder Income, 5451-2 Foster, Skokie, Illinois.

PRICES? Save on jewelry parts. Bracelets 6 for \$1.00. Free catalog. Jewelmex, Box 6, Rancho Mirage, California.

MAIL Order rules for beginners. Book \$1.00. Central Trading Co., Box 254, Sudbury, Ontario, Canada.

PREPARE Tax returns—Remunerative! Write Taxbox, 6196 Walnut, Omaha 6, Nebraska.

PLAN Your spare time now to suit yourself. \$40-\$75 weekly: \$1.00 guaranteed. Mopo, Box 104, Hannibal, Missouri.

MAKE Money gathering roots, herbs, weeds, leaves, tree seeds, flowers, plants! Over 200 varieties! Listed buyers for all you can ship! Easy! Pleasant! Get free book! Revealing beginners packet, 25¢. Fortune Mart, 221-A Lincoln, Worcester 5, Mass.

GROW Miniature trees for pleasure or profit. Complete course for \$2.00 prepaid plus free training pot and seeds. J & J Nurseries, P.O. Box 205, Canandaigua, N. Y.

WE Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 27,000 customers. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Wash.

MAKE Money fast at home. Thirty money back guaranteed plans \$1.00. Parsons, 237 N. Viceroy, Azusa, Calif.

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FORMULAS; All kinds, latest, best. Literature free. Kemikal, Park Ridge, Ill.

PRACTICAL Formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

LATE. Modern manufacturing formulas. List free. Moon Chemical, Marlville, New York.

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PHOTO-Seal. Complete electric laminating kit for wallet size photo's, cards. \$14.95. Refills available. Therm Appliance, St. Charles, Illinois.

PLASTICS! New, do-it-yourself casting and molding materials. Crystal clear for embedding specimens, ivory, ebony, marble and colors for jewelry, novelties and industrial castings. Illustrated catalog 25¢. Castacraft Corp., Dept. N-67, P.O. Box 555, Palo Alto, California.

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25¢ for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. M-101, Woodstock, Illinois.

VACUUM Forming. New process used by manufacturers. Instructions, plans \$1.00. Box 742, Galesburg, Ill.

ELECTRIC Laminating kit. Hobby, gift, or profit. Burr, 330 East Center St., Kalamazoo, Mich.

PLASTIC Molders supplies. Catalog 25¢. Gel, Box 281, Union, N. J.

PLASTIC Sheets. All types, plexiglas, acetate, vinylite, laminating plastics, and supplies. Covers, folders. Free price list catalogues. Arthur Blank and Co., 44 Causeway, Boston 14, Mass.

PLEXIGLAS. Square foot cost. 1/16", \$1.30; 1/8", \$1.52; 3/16", \$1.86; 1/4", \$2.21; 3/8", \$3.39; 1/2", \$4.36. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23 Sussex Avenue, Newark, N. J.

LAMINATING Supplies. Free price list. Solomonson, 48 Cornhill, Boston 8, Mass.

BOXES. Plastic. Free list. Anthor, 170 Bay 33 Street, Brooklyn, N.Y.

LEARN Plastics fabrication for spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 13, Ore.

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BOOKS: "Visualized Chemistry," 304 pages, illustrated, \$1.20. "Visualized Physics," \$1.20. "Visualized Science," \$1.15. Information free. Franks, 3121 South Racine, Chicago 8.

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60% PROFIT On cosmetics—Famous nationally advertised Hollywood cosmetics pay 60%. Make \$25 day up. Hire others. For free samples, details, write Studio Girl, Glendale, Calif. Dept. 128110.

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AGENTS—\$400 To \$800 monthly selling brand new health aid. Fast repeat orders. Warfield, Dept. 3D, 630 Stanley Ave., Brooklyn 7, New York.

FREE Sample! Beautiful feather pictures. Send 12¢ stamps mailing. Sylviak, Apartado 9036, Mexico 1, D. F.

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ENJOY Big spare-time profits getting new and renewal subscriptions for all popular magazines from friends, neighbors, churches, etc. Build your own business. Start now. Free catalog. Complete information and supplies. National Publications Company, Dept. PM, 4055 Wilshire Blvd., Los Angeles 5, California.

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GOLD Or silver letters, numbers. Windows, doors, trucks. 1" to 6". 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

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TREMENDOUS Profits! Every man, woman and child a customer. Used suits \$1.50, pants 35¢, dresses 20¢, shoes 20¢. Operate from store, home, car. Free catalog. Superior, 1250-A Jefferson, Chicago 7.

FOG—Stop windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee 52, Akron, Ohio.

REAL Diamond rings. Nationally advertised. Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleamlight, 111-B8 North Columbus, Mount Vernon, N. Y.

SELL Decals, bumper signs. Top commissions. Box 2223, Paterson, New Jersey.

CHAMPION, AC, Autolite spark plugs. Reconditioned, guaranteed. Sells on eight service stations, garages, car lots. 100% profit. Free sample. City Motors, 2913-E Fannin, Houston 2, Texas.

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TILE Agents wanted, sell floor and wall tile, sparetime. Chicago's largest tile wholesaler. Catalogue and samples upon request. Century Supply, 3005-P N. Austin, Chicago 34.

MEN, Women, make money spare time plus new car given to producers as bonus. Amazing hostery guaranteed to wear without holes, snag and runs, or replaced free. For example, lovely 60 gauge nylons, guaranteed for as long as 1½ years, or replaced free. Write Wilkint, 17811 Wash., Greenfield, Ohio.

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DAMASCENE Earrings! Exotic orientalism. Huge profit. Ohga, PM124, Siganokusatsu, Japan.

SEEKING New products? Get my outfit 47 money-making specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee 54, Akron, Ohio.

"GEM-16" Camera \$2.00. Free literature! Gem Corporation, CPOB 545, Tokyo.

SOMETHING New! Imported hand painted tile pictures in hand carved frame. Bullfight action, landscapes, typical Mexican scenes, exciting colors. Complete assortment. Free brochure. California Imports, 1436 Ellsmere, Los Angeles 19, Calif.

FREE Sample razor blade, from Germany. Revolutionary accomplishment. First time in U.S.A. Agents wanted. Paul Weil, Dept. B19, Box 157, New York City 31.

\$25 DAY, Easy. New fire extinguisher. Retail \$2.95. Profit \$2.00. Free sales kit. Edconco, 115 East 44th Street, Dept. P11, New York 17, New York.

FABULOUS Profits. Pictures of birds made with real feathers in breathtaking colors. Free brochure. California Imports, 1436 Ellsmere, Los Angeles 19, Calif.

ANTI-Fog sells in winter like hoops in summer! Remit \$1.00 today; sell profitable Anti-Fog tomorrow! Merix, 1021 East 55th Street, Chicago 15, Ill.

BEAUTIFUL Feather pictures! Free details. Sample 20¢ stamps. Apartado 1868, Mexico 1, D. F.

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UP To 70% off, nationally advertised merchandise. 106 page catalog, over 4,000 items, \$1.00. Refundable first order. Keystone Industries, 1311 Morse, Chicago 28, Illinois.

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USED And new watches \$2 up. Free list. Southern Watches, 5-PM So. Wabash, Chicago 3.

BUY Wholesale! 100,000 nationally advertised products. Appliances, cameras, sporting goods, housewares, watches, typewriters, tools, clothing, etc. Discounts to 80%. Buy-Rite, Box 258, Hawthorne 4, New Jersey.

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FREE Catalog—Including over 100 multi-color pages of appliances, luggage, jewelry, power tools, office equipment and giftwares. No deposit, no obligation. Write now for your free copy. The Supply Company, Box 150, North Manchester, Indiana.

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BUY Your TV and radio tubes wholesale. Send today for our latest free catalog of tubes, batteries, components. All top quality, all priced to save you plenty! Zalytron Tube Corp., 220 West 42nd Street, New York City.

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You want prestige, increased income, job security, an assured future. Everyone wants these things for they represent a better life.

And they can be yours. You can *earn* success. All you need to do is *take action*.

Success follows naturally from two steps, which are equally important:

1. **You must make the basic decision to succeed.**

If you are aware of the importance of making this decision, then you are well on your way to achieving success. You are far ahead of some people, who simply aren't willing to earn success. Really, they say, it's much easier to drift along in this old rut. It may not be a comfortable rut, but why change? We're getting by. Besides, we're "too busy" to make any extra effort.

The lives of thousands of successful men—those who have climbed out of the "rut"—show an amazingly similar pattern. They weren't satisfied—*so they made a decision*. In each man's life there was a moment—perhaps the same as this moment in yours—when he *decided to succeed*. From somewhere deep inside himself he drew an overwhelming determination. He *would* succeed. From that moment he focused all his energies in a single direction—to succeed in his chosen career.

In most cases, once he had made this all-important decision, he found that the sacrifices were small compared to the rewards. Indeed, most of these successful men found that there were no real sacrifices, that work toward their goal became *fun*, that every new step upward brought a new challenge.

But first they had to make the decision to succeed. Only you can make this basic decision for yourself. No one can make it for you. And it must be made without any reservations.

2. Once you've made this decision, only one thing remains to be done: **You must take action.**

The key to success is *action*. Only by do-

ing something can you succeed. The world is made up of many people who "get by" in their less-than-comfortable rut, and a few people who *perform* to lead the others. You can be one of these leaders.

What sort of action? Obviously the first step is to **train yourself for your career**. No one ever has enough training. It is a recognized phenomenon that the more training and education a person gets, the more eager he is to learn. Whether you dropped out of high school or earned a doctor's degree in college, the best action you can take toward your goal in life is to obtain still more intensive training.

What Success Can Mean

A BETTER JOB: The average American production worker uses more than \$12,000 worth of equipment in doing his job; the executive's responsibility runs into the millions. That's why employers are insisting on men adequately trained for the job. The trained man doesn't make costly mistakes.

GREATER SECURITY: U.S. Department of Labor statistics show that in times of recession, those men who have the least education and training, in general, are the ones that are laid off first. Highly trained men retain their jobs. The greater your training, the greater will be your security in your job.

FASTER PROMOTION: Automation is bringing about an increase in the number of skilled jobs. The men with sound basic educations will be promoted to fill them. Men with skills as a result of education and training are important. Employers are first to recognize this fact.

RAPID ADVANCEMENT in the Armed Forces: It costs up to \$8200 for the Armed Forces to train each specialist, and \$125,000 to train a jet pilot. Naturally men with strong educational backgrounds are selected.

PRESTIGE: The educated man is looked up to in his community. His opinions are sought. And his opinions are valuable because he has been educated. Such a man becomes a leader in his community.

GREATER INCOME: Department of Commerce figures show that the average high-school graduate can expect to make almost \$50,000 more during his life than the man who dropped out of school after the eighth grade. The college graduate can expect \$100,000 more than the high-school graduate.

Education Needed for Success

Education has always been the foundation upon which successful careers were built. In the past, of course, a man might be highly successful without formal education—but only because he educated himself.

In these days of rapid technological progress, education no longer is just important, it is *essential*. The speed of development in recent years is almost beyond comprehension. We not only are making progress at a phenomenal rate, but that rate is constantly accelerating.

To progress today, to achieve, to fulfill his goal in life, man must develop his capabilities to the utmost—he must become educated.

Each man has a choice. He can continue his education—no matter what his circumstances—to further his career. Or he can continue to “get by” in his less-than-comfortable rut.

Millions of successful men not only recognize the importance of education, but they have learned that the pursuit of knowledge is an adventure of the highest sort. Learning is downright fun.

Ask the successful chemist, who sees a strange new world in the reactions in his laboratory. Ask the mathematician, who sees the beauty of the universe in his figures. Ask the artist, who feels a kinship with the masters.

Or ask the young family man who, tired of the drudgery of an everyday job, studies a few hours each night to prepare himself for his job of the future. He knows that there's a challenge to learning, that each lesson can be an intellectual adventure of a sort he had never experienced before, that the process of learning is something to be savored and enjoyed late at night in the lonely but exciting presence of his own awakened mind.

Steps Toward Success

1. Decide on your goal. You may now be working in a particular field, and feel the need for increased training. You may want to switch fields completely. Examine your interests, your abilities. If you're mechanically inclined, maybe engineering is for you. Are you a radio ham? You may turn out to be an electronics technician. Make a study of various occupations. Compare your abilities and interests with the work involved. Then select your goal.

2. Study the school ads in this and subsequent issues of *Popular Mechanics*. The schools represented here are among the finest in the United States. They have

helped students succeed for generations. They offer complete educational programs, from basic high school courses and trade courses to post-graduate college courses.

3. Select a school, then enroll promptly. Here are some of the types of schools you should consider:

Vocational or trade schools. These institutions offer intensive training in specific skills and certain professions. They teach a student how to do a particular job well.

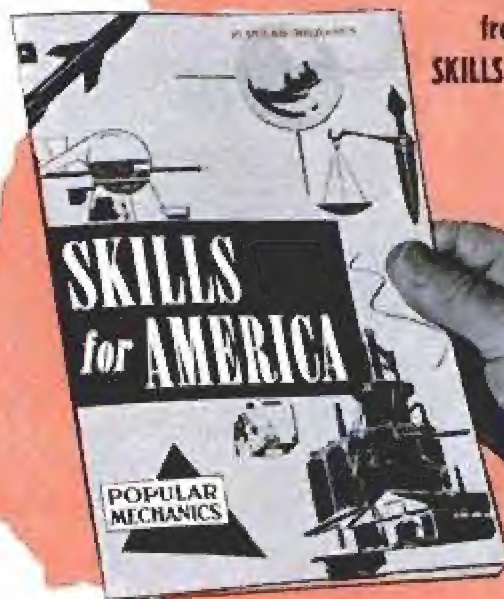
Technical institutes. These schools offer technical programs based upon the principles of science and engineering. They teach the logical processes to be used in solving problems, and provide intensive background knowledge. Programs of study are not usually as long as professional schools of engineering. Graduates of these schools frequently become engineering technicians, though they may also become professional engineers.

Correspondence schools. If circumstances don't permit you to study full time at a residence school, by all means consider home-study courses. More than 1½ million persons are taking home-study courses at this moment. Employers have been among the first to recognize the value of home-study courses. More than 5500 firms now have agreements with correspondence schools to train their personnel. You study when you have time, but your instructor gives you individual attention. You are in a class by yourself!

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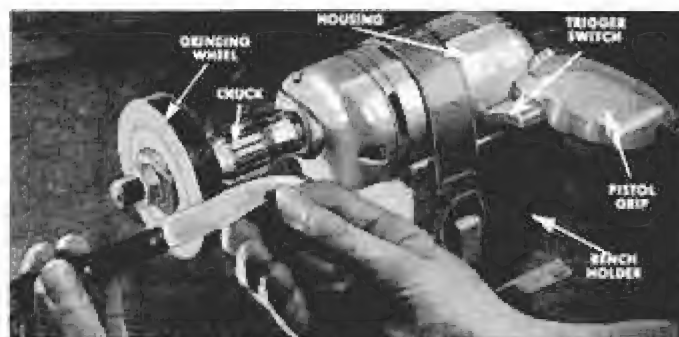


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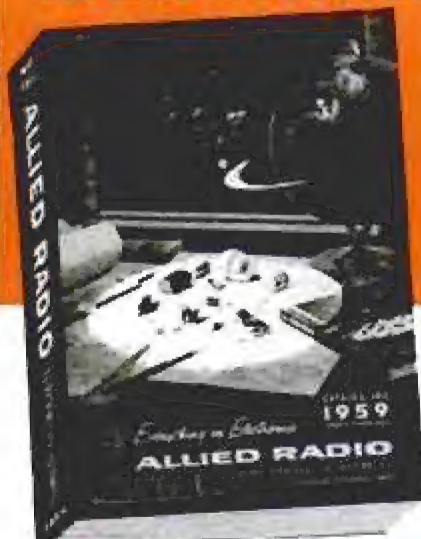
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement, but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.



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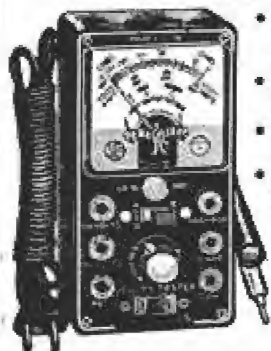
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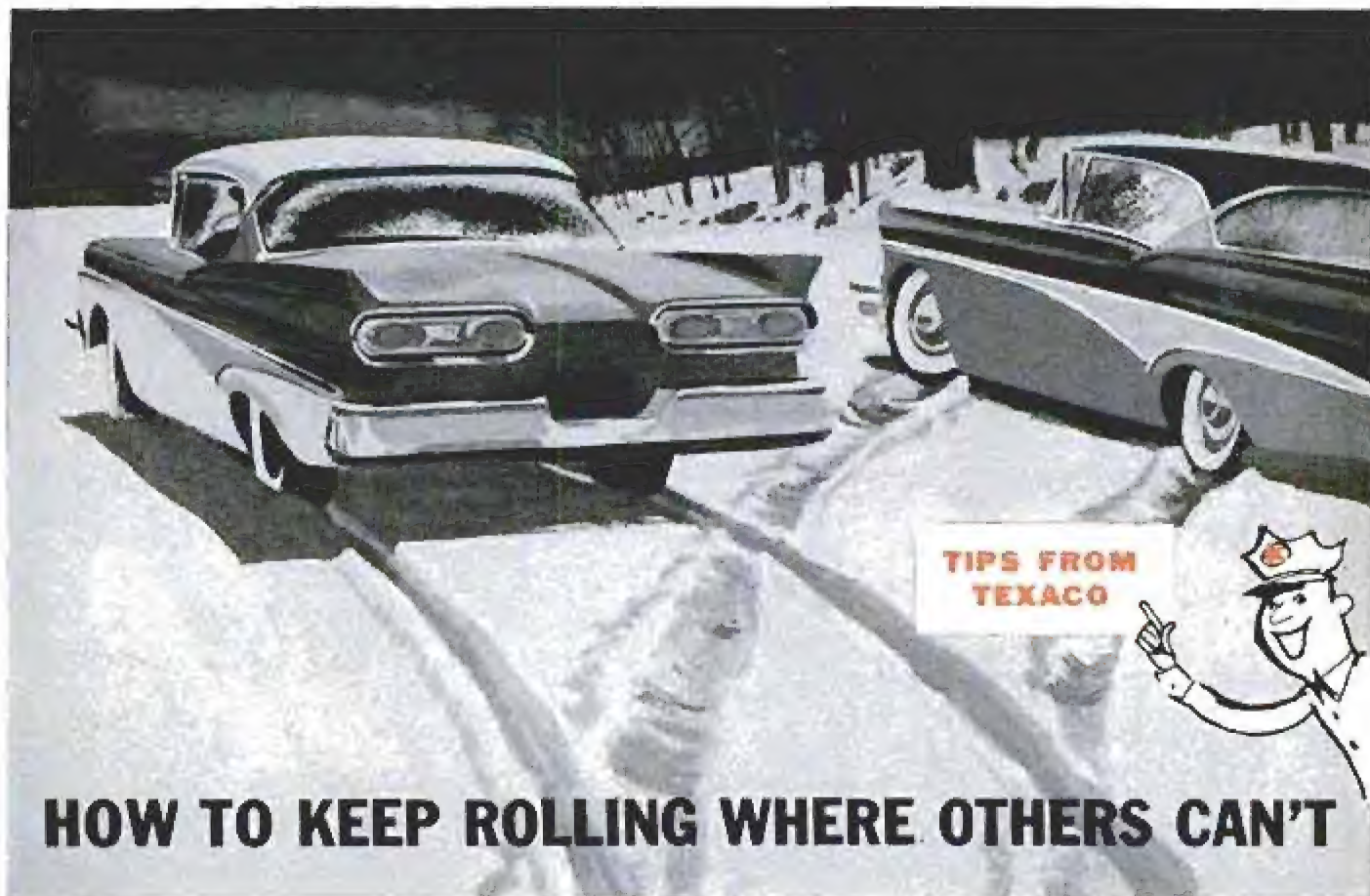
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Twenty tuned reeds in a plastic case provide rich tones from a roll-playing harmonica. Like a pocket-size player piano, air is blown through the rolls as they turn past the reeds. To make music, you just blow and crank.

Effect of Fallout on Food Varies With Rainfall

Contamination of food by radioactive fallout from nuclear explosions is greater in the Amazon Basin than in the United States—though there is five times as much fallout in the United States. This is explained by the unusual weather conditions in the tropics, according to the American Chemical Society. For example, concentration of strontium-90, considered the most hazardous form of atomic debris, is generally three times as high in the United States as in the Southern Hemisphere. But the heavy tropical rainfall brings strontium-90 down from the upper atmosphere. And over the years it also has washed some of the calcium out of the soil. Both these factors tend to increase strontium in food crops and milk. This is because strontium is chemically related to calcium and tends to replace it in crops and in bone structure. This happens especially when calcium levels in the soil are low.

When the submarine *Nautilus* made the first trip under the polar ice pack, its crew viewed the underside of the ice on a 21-inch TV monitor connected to a camera mounted in a pressurized steel capsule at the top of the conning tower.



GETTING where you are going over icy roads and other treacherous surfaces is all a matter of taking simple precautions and some easy-to-learn driving know-how.

First of all, proper gas pedal, brake pedal and steering wheel handling will prevent mishaps. The rule is, *make no sudden moves!* Drive as if you were balancing a full glass of water on your dashboard. That means

slow down, turn and accelerate gently . . . *g-e-n-t-l-y*. Try not to come to a complete stop—especially on an upgrade—you may have difficulty starting again.

What's more, even if you use tire chains or snow tires all winter, carry a dozen or so small paper bags filled with sand. They'll start you moving when nothing else will. Just throw sand under each rear wheel and go.

How to Safe-T check your engine against winter

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More 1959 Cars Debut in DETROIT'S YEAR OF DECISION

*Your reaction to these new cars
may determine the auto industry's course
for the next 10 years*

By Arthur R. Railton

WHO'S RIGHT? The big boys like General Motors who believe the public's reluctance to buy 1958 cars was due to the recession, to a lack of confidence in the future, to the need for more enticing, exciting designs?

Or the little boys like American Motors who believe that the public did not buy the 1958 cars because they were too big, too expensive, too luxury loaded?

Who's right?

Economists, product planners, stylists, engineers, all want to know. The only person who can tell them is you. What you do in the next four or five months will answer the question.

Your answer will make 1959 a year of decision. It could chart the industry's course for years to come.

If you like and buy the bigger 1959 cars with their flat roofs, double-wrap windshields, tremendous rear-glass areas, lower seats, bigger fins, longer rear decks and more luxurious interiors, you'll disprove those critics of Detroit who have been ranting wildly all year.

If you don't like these cars and if you prove it by buying Ramblers, foreign cars or the soon-to-be-announced small Studebaker, you'll force the big boys to reassess their position and to rechart their course.

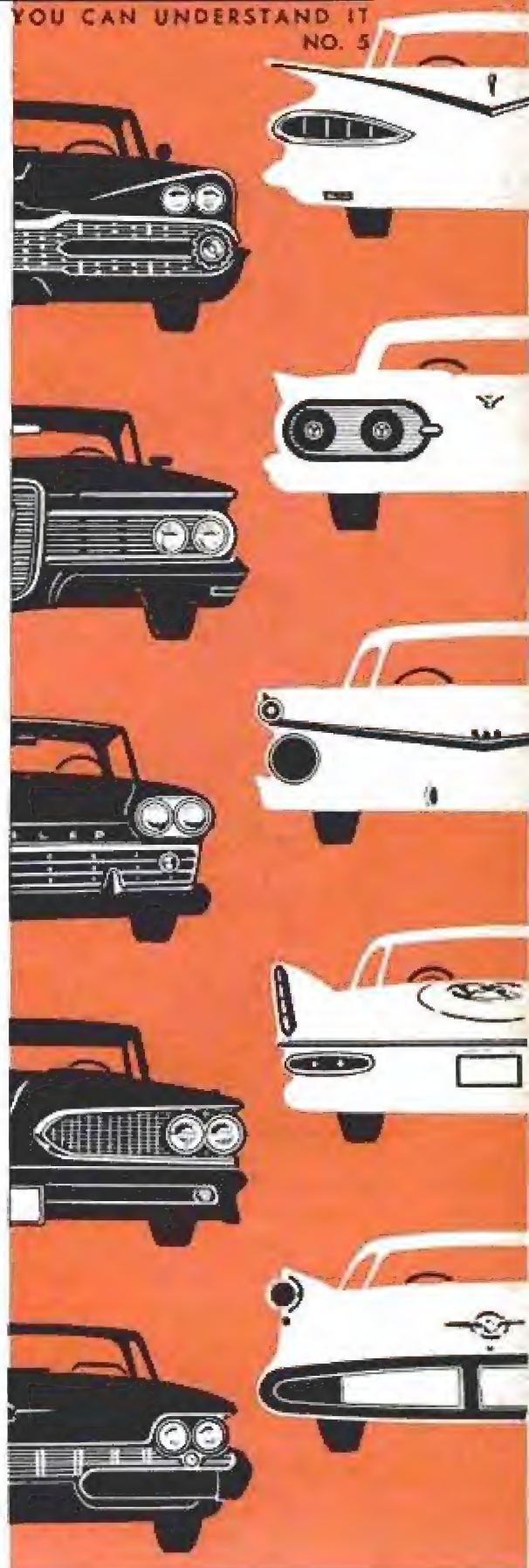
General Motors is betting that the critics are wrong and is making it easy for you to help prove it. The new GM cars, from Chevrolet up, are fresh, alive and handsome. They are bigger, lusher and better looking than ever. That makes the choice a clear one: You can make your decision on clear-cut alternatives. The choice is whether you want comfortable, dependable transportation alone or whether you insist on glamor, prestige and a lifted morale as well as good transportation.

Rambler is betting with the critics (although it hedges somewhat with its Ambassador models which give no additional interior room for people or luggage despite a longer wheelbase and body). Convinced that the public wants sensible, neat designs that provide transportation and not transmutation, American Motors is offering cars virtually unchanged from 1958.

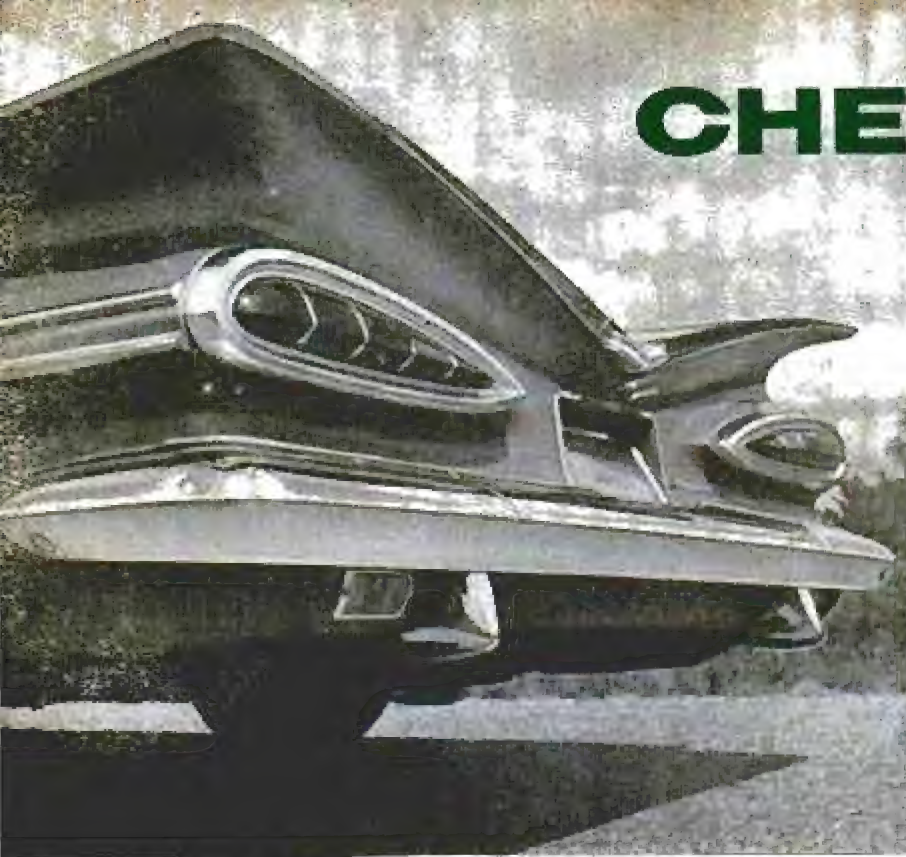
Chrysler and Ford are in a high-noon position somewhere between AM and GM. After an admittedly

(Continued to page 252)

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 110 NO. 5



CHEVROLET



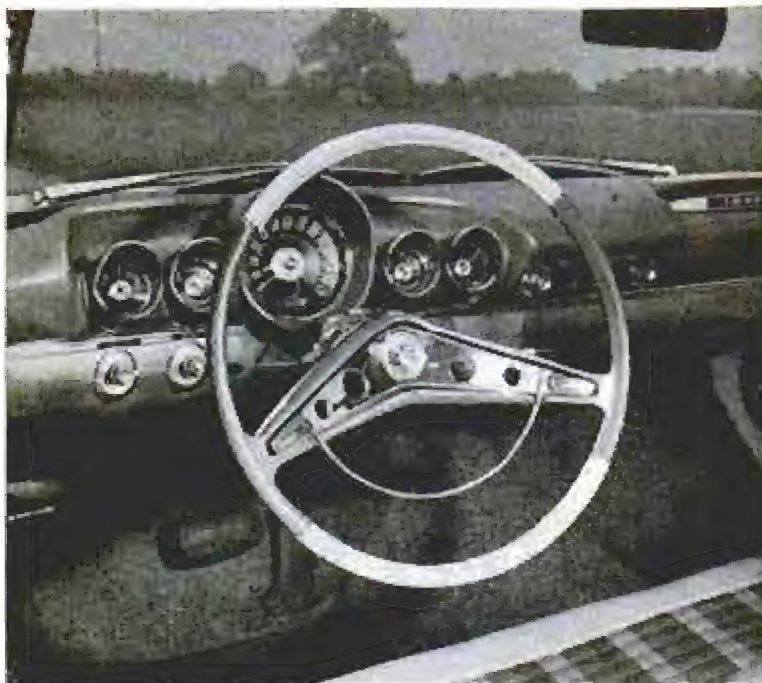
Backup lights are mounted below a plain, straight-across bumper. Gas filler opening is behind the license plate

STYLING IS THE THING with the new Chevrolet, as with all GM cars for 1959. Its low, flaring rear end is as expansive as the deck of an aircraft carrier and looks almost as wide from the driver's seat.

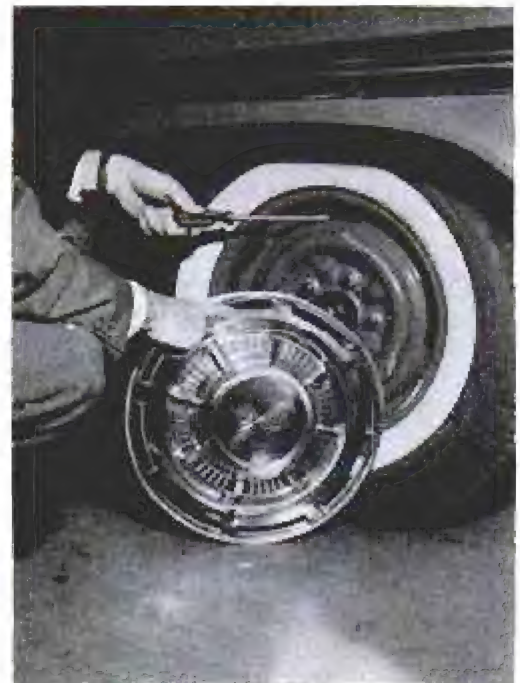
Horizontal taillights squint, like giant cat's eyes, from under chrome eyebrows.

At the front, two sets of paired headlamps are set as low as the law allows to accentuate the road-hugging design. Consequently, they provide better lighting in fog. Over the simple, unobtrusive grille, two wide nostrils serve as air intakes for the engine compartment. Tucked in their outer corners are turn-indicator lights.

Engine changes are minor. A new camshaft and changed carburetor metering in the Six mollify the public's demands for more



Holes in boomerang-shaped wheel spokes provide a racing-car character to the car. Horn ring has thumb button near rim



Slots in the wheels and extra-cost wheel covers create a flow of air to cool brakes

Visibility is limitless in the flat-roof model of the Impala four-door hardtop with wrap-around rear glass





Flat, flaring wings at the rear of the Impala convertible make it look several feet longer than it is

miles per gallon. The camshaft provides a shorter valve overlap, reducing waste at low engine speed. As a result, horsepower is cut to 135 from last year's 145—thus the pendulum swings back.

In the two V8 engines, horsepower is unchanged (185 and 250). Rear-axle ratio is now 3.08 to 1 with the big engine, instead of 3.36 to 1 and here, too, economy is up slightly at the expense of performance.

Steering effort with power assist has been reduced markedly. The over-all ratio of the manual steering unit is up, reducing effort here too, while increasing wheel wind. A flexible coupling in the steering

shaft isolates the wheel from road shocks.

Ride is softened from the firmer 1958 package. Cornering stability suffers somewhat, but there is no feeling of loss of control. Tar strips and small road bumps are swallowed up without fuss and noise levels inside the car are much lower.

Brakes are improved by 27 percent more lining area. Front shoes are $\frac{3}{4}$ inch wider, rear shoes $\frac{1}{4}$ inch wider. Long slots in the wheels direct air over the larger drums to speed heat dissipation. Air suspension is optional again, as is fuel injection. Chevy also offers the highest compression in the business: an optional 11 to 1. ★ ★ ★



Station wagons have no upper tailgate. Glass winds down into lower half of door manually or electrically (option)



Trunks are bigger than ever. Chevrolet's has a high sill over which you must lift your luggage

Rear window and double-wrap windshield of Impala hardtop are huge. Roof seems almost postage-stamp size

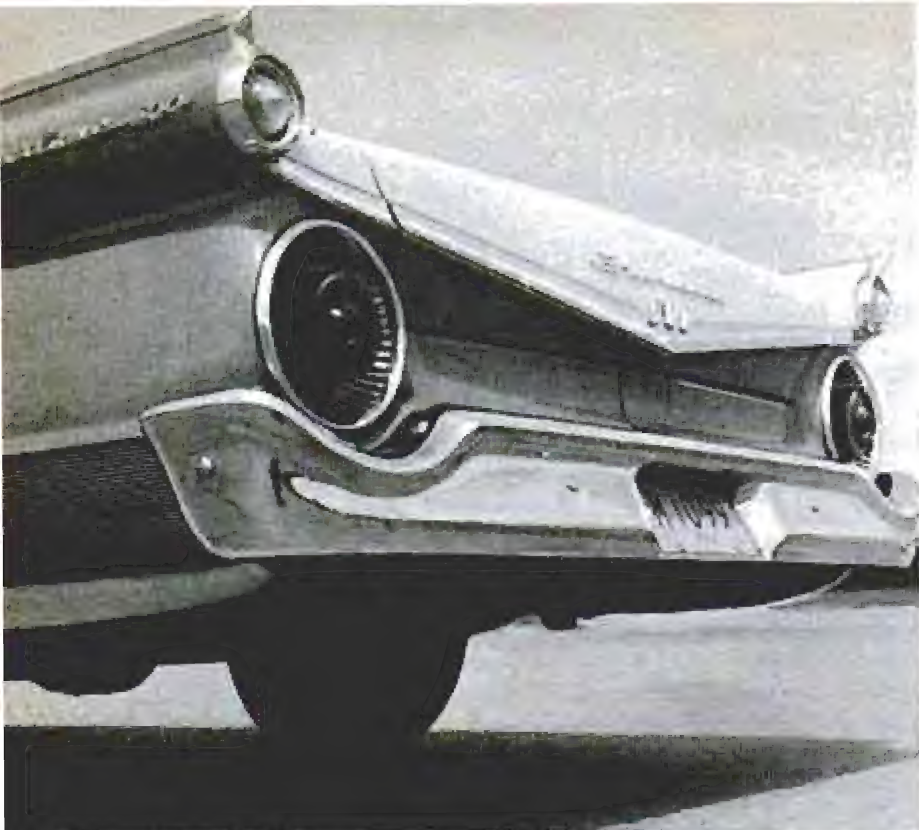


FORD

YOU'LL HAVE no trouble recognizing the 1959 Ford—it has the Ford personality all over its new sheet metal. But changes go deeper than is apparent—they perhaps herald a bold change in philosophy.

For the first time in years, horsepower has been reduced in the interest of economy on two of the four Ford engines (the 1959 ratings are 145, 200, 225 and 300 horsepower compared to 145, 205, 240 and 300 in 1958). Torque is reduced on all four engines also.

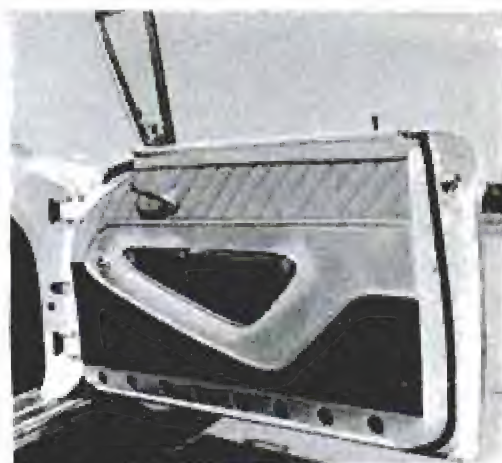
Compression ratios are decreased across the board. All except the power-pack 352-cubic-inch optional V8 now use regular gasoline which, Ford says, saves as much as a dollar a tankful.



You don't have to be told this is a Ford—the big saucerlike taillights identify it. The two upper lenses are backup lights



Ford continues its neat, uncluttered dash, but has replaced the curved shroud with a straight one like the rest of the industry



Holes in door panel are decorative only, but would be ideal place for reflectors

Although rumors of competition are heard often, Ford still has the only retractable hardtop in the industry



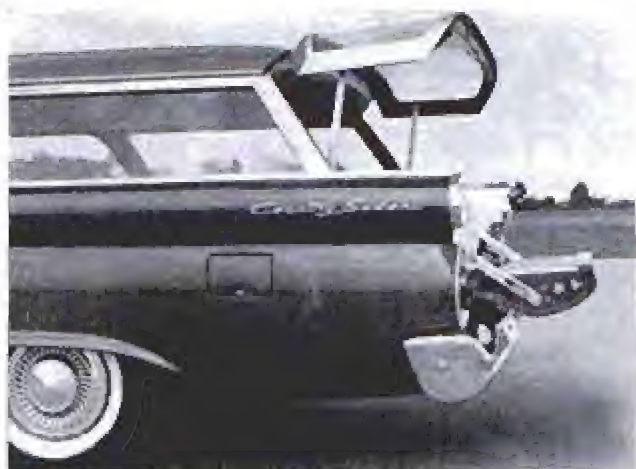


Ford says its cars, like this Fairlane Sedan, have "dignity and quiet good looks," with no excessive curves

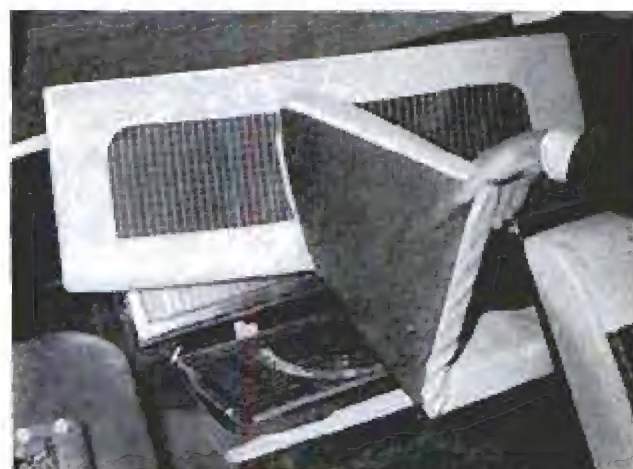
A low-cost two-speed automatic transmission with 105 fewer parts than the regular three-speed Cruise-O-Matic is available as Ford moves closer to the soon-to-come day when the automatic transmission will be included at no extra cost. The new transmission weighs 22.8 percent less. However, total car weight is up at least 150 pounds. Other economy-related items include a full-flow oil filter which permits

4000 miles between oil changes. Aluminum-coated mufflers have asbestos insulation to reduce rusting caused by condensation to give a life expectancy of two years.

The cars are longer, all being on the big 118-inch wheelbase this year. Custom models are six inches longer, Fairlanes one inch longer, all are 208 inches over-all. They are 1.4 inches narrower and interior dimensions are somewhat reduced. ★ ★ ★



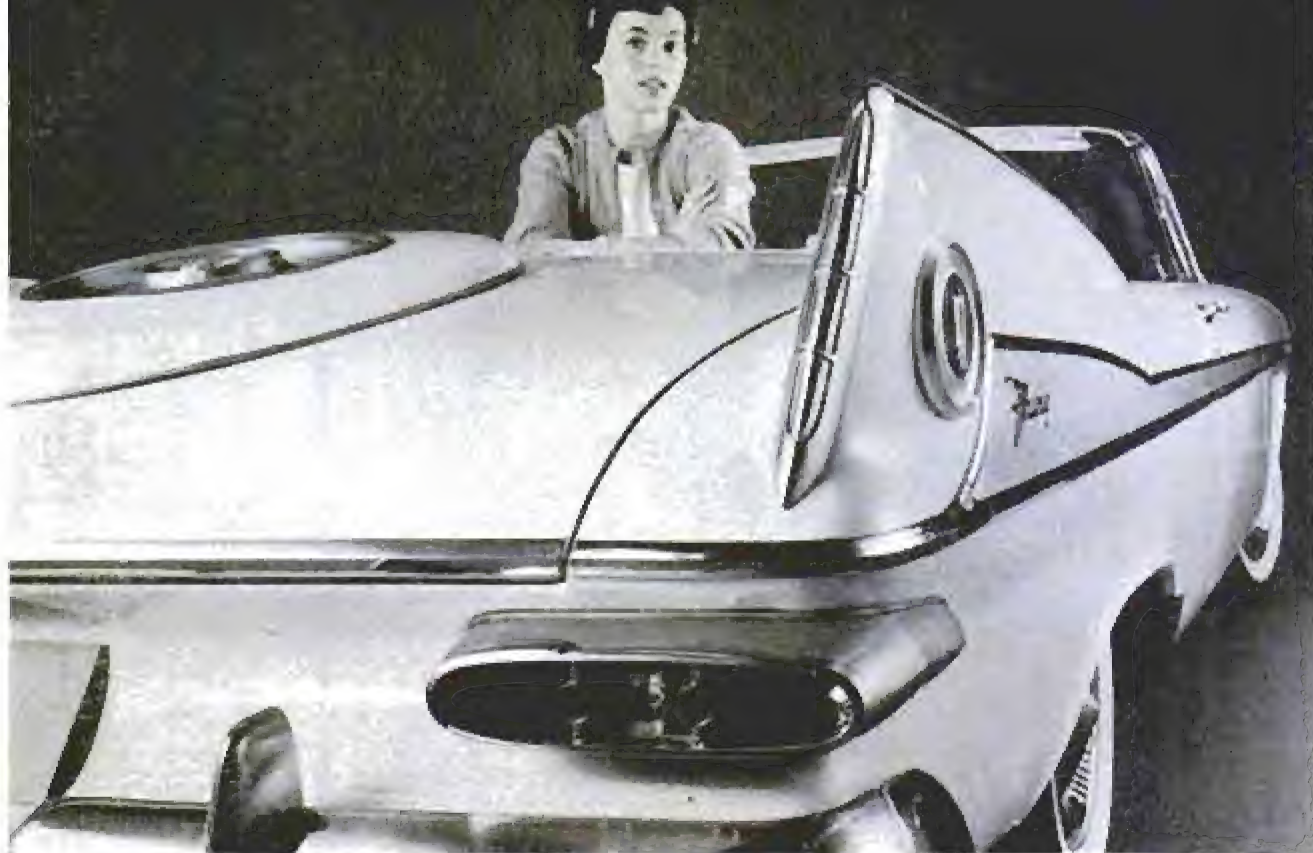
Unlike most competitors (which use rolldown rear glass), Ford has a two-section tailgate on wagons



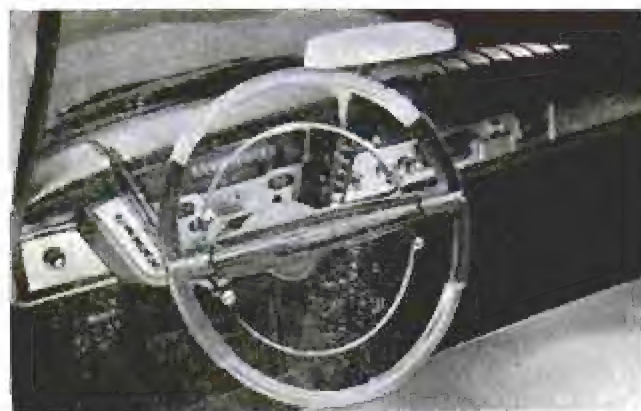
Third seat of the wagon folds into floor. Secret of it is the use of removable foam-rubber seat cushions

Country Sedan has 52 percent of its weight on back wheels, making it a great car for driving on icy roads





From the rear, the obvious change in the Plymouth is this thin fin shape and the horizontal taillight



Completely new is the dashboard with transmission push buttons arranged diagonally to left of wheel

THIS YEAR'S "hot one" may be the 1959 Plymouth. It has a big V8 optional engine of 361-inch displacement (biggest in its field) that puts out 305 horsepower and 395 pound feet of torque.

Of course, this souped-up V8 with four-barrel carburetor, dual exhausts, dual breaker points, heavy-duty valve springs and special camshaft is optional at extra cost. The regular V8 gets 230 horsepower out of 318 inches (a power-pack version develops 260 horsepower).

If you prefer economy to power you can order a special penny-pinching rear axle (at no extra cost) that is said to increase gasoline mileage as much as 10 percent.

Top model in the line this year is the Sport Fury, which comes only as a hardtop (below) and convertible



Styling changes are extensive despite the use of a carryover body shell. The front-end treatment is all new with scalloped eyebrows over dual headlamps and an eggcrate grille. At the rear, changes include taillights that are now horizontal beneath the slender chrome-edged fins. You may, at extra cost, have a dummy spare-tire cover embossed in your trunk lid, *a la Imperial*.

Over-all length is 208.2 inches, an increase of 2.2 inches, due entirely to the extended bumpers. Width has been reduced to 78.0 inches.

Push buttons for automatic-transmission cars are now arranged vertically alongside the instrument grouping. A similar vertical row of buttons on the right side of the dash controls the power-operated heater and ventilating system.

Also optional on Plymouths for 1959 is a combination air-and-steel suspension system. Torsion bars are retained in front (shortened and slimmed out slightly) and an air-bag system has been added to supplement the regular leaf springs in the rear at extra cost. It is in the rear where most load leveling is needed.

Since this is the principal attribute of air suspension, Plymouth (and Chrysler) feels that bags are not needed up front. With this system, the steel springs will still support the load if necessary, eliminating any possibility of breakdown should the air system fail.

Swivel front seats are standard on the Plymouth Sport Fury for ease of entry and exit.

Plymouth has dropped the series name

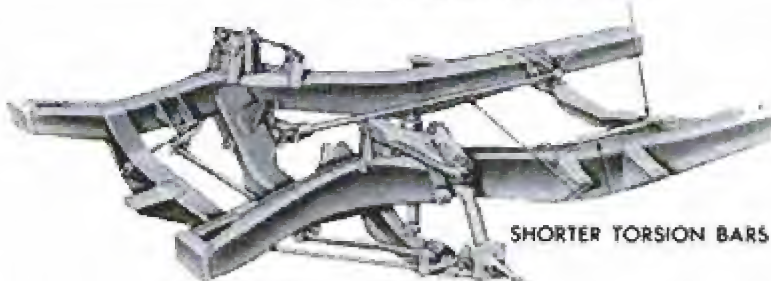


Distinctive are Plymouth's scalloped front fenders which, along with its eggcrate grille, provide a fresh look to the front end



Available at extra cost is a dummy spare-tire cover that is embossed on the trunk lid. The canted tailfins are new also

REDESIGNED ANCHOR POINTS



Torsion bars are retained in front, but have been shortened and thinned out somewhat. Air bags are available on the rear wheels

Plaza and now the models are arranged in this order (from bottom to top): Savoy, Belvedere, Fury, Sport Fury (the Sport Fury series includes only two models, a convertible and a two-door hardtop). ★★★

New for the wagon trade is a ceiling-mounted air conditioner. A lockable luggage space is also optional



PONTIAC



Winding country roads are a pleasure in the easy-to-handle, road-hugging Star Chief four-door hardtop

YOU HAVE PLENTY of choice in Pontiac this year—horsepowers range from 215 on a special economy V8 to 345 on the optional triple-carburetor V8.

Despite this broad range, all engines share the same displacement of 389 cubic inches. The special economy version is an indication of the changing trends in Detroit thinking. It has a smaller carburetor to provide a leaner fuel mixture. Its special camshaft has reduced valve overlap for minimum fuel waste. The rear-axle ratio of 2.87 to 1 adds to its miserliness.

Handling is excellent. The car has a confident sure-footedness due, along with other things, to a tread that is increased

nearly five inches in width. The wider tread, incidentally, also reduces underhood temperatures and improves engine accessibility, something mechanics will enjoy even more than owners.

Brakes have been improved by increasing the lining area nearly 10 percent and also by the addition of a cooling flange to the front drums.

Pontiacs come in two wheelbases: The 122-inch Catalina (213.7 inches over-all) and the 124-inch Star Chief and Bonneville (220.7 inches over-all). However, in one of Detroit's great mysteries, the smaller model of the series has more interior room than the big ones. ★ ★ ★

Pontiac has a highly styled rear-end treatment with twin fins on each fender. This is a Catalina hardtop





Bonneville convertible has bucket seats in front, stylishly contoured. Wide dash shroud eliminates windshield reflections



Stylists keep playing hide and seek with gas-station workers. Here's the gas cap



Spare tire lies flat. Ledge covers the rear axle. This is the "small" Catalina trunk, the others have even more luggage room



Roof of four-door hardtop extends beyond the tremendous wrap-around rear glass

Station wagon has an optional rear-facing third seat and its back window rolls down into the tailgate





Most noticeable new feature on the 1959 Dodge Coronet four-door sedan is its bold slanting "eyebrows"



Above, Dodge now has vacuum-actuated controls for the heater. Push buttons for the control are located to the right of wheel. Below, oblique chrome shrouds wrap around jet-tube taillights



Dodge offers two four-door wagons. This one is the Custom Sierra model with a rear-facing third seat



DODGE

DODGE STYLISTS have given the front end of the 1959 models an all-new look with its bold slanting headlamp eyebrows and a wider, oval-shaped aluminum grille.

At the rear changes are not so great, but the Dodge character is retained with enlarged swept fins and jet-tube taillights.

A new roof on four-door hard-top models has a slightly raised rear section which permits the rear seat to be moved backward inside the greenhouse. This move increases rear-seat legroom as much as three inches with little or no loss in headroom. The rear window on this model is 15 percent larger than previously.

Dodge has four different engines again this year. Lowest on the power list is the six-cylinder L-head engine of 230-cubic-inch displacement. It develops 135 horsepower and has an 8.0 to 1 compression ratio. Changes on this engine are minor.

The 326-cubic-inch V8 is all new for Dodge this year and it has a 9.2 to 1 compression and two-bar-



Its famed sweptwing design more emphatic than ever, the Custom Royal convertible looks as sleek as a jet

rel carburetor. Its output is 255 horsepower.

Next up the list is the 361-cubic-inch V8 which is the powerful D-500 version used last year. It develops 295 horsepower with a two-barrel carburetor, 305 horsepower with a four-barrel carburetor.

Biggest Dodge engine this year is the 383-cubic-inch V8 which comes in two models: One puts out 320 horsepower; the other puts out 345 horsepower with two four-barrel carburetors, a special camshaft and heavier valve springs.

An aluminized dual-exhaust system is optional at extra cost on most models. Some models have it as standard equipment.

Over-all length has been increased by 3.5 inches (it is now 217 inches), width is greater by 1.7 inches (now 80 inches). Dodge's wheelbase is still 122 inches.

Interiors have been restyled and push-button heater controls are optional as are electronic headlight dimmers and automatic rear-view mirror tilters. The steering wheel is flatter on the top half than the bottom so it could be raised to provide more room under the wheel without blocking vision of short drivers. ★ ★ ★



Swivel front seats are optional on Custom Royal models. All Dodges have added padding in the center of rear seat this year

Four-door hardtops have a new stepped roof which is slightly higher in the rear for more interior room





Two-tone roof and new front end are changes on the 1959 Chrysler. This is the Windsor two-door hardtop



Completely fresh is the rear-end styling. Bumper is more massive this year and has a recessed anodized-aluminum insert



Above, top is smaller than bottom half of wheel, allowing it to be positioned higher for more legroom without blocking vision. Below, rear of hardtop roof is stepped up for added room

CHRYSLER

CONTINUING its trend-setting style, Chrysler redesigned its front and rear while adding a fresh look to its roof. Anodized-aluminum grilles wrap around front fenders.

Under the sheet metal, Chrysler has a new V8, replacing the heavier and more expensive hemispheric-head engine with its two rocker-arm shafts. The new single-rocker-arm-shaft V8 comes in two sizes: 383 cubic inches in the Windsor and Saratoga; 413 cubic inches in the New Yorker and 300E. Horsepowers are 305 and 325 on the small engine, 350 on the New Yorker and 380 on the muscular 300E.

Exterior dimensions are about the same, except for the Windsor being 1.5 inches shorter. Interior room is the same except for a healthy 3-inch addition to rear-seat legroom on four-door hardtops and a small increase in kneeroom under the steering wheel.

Swivel seats, rear-view mirrors that dim themselves, push-button heaters and air suspension as a supplement to rear leaf springs are available on all models. ★ ★ ★





Principal styling change is the front grille which has been emboldened to make the car look lower

IMPERIAL

IMPERIAL CONTINUES its luxury look, enhancing it with a stainless-steel roof on Landau models (at extra cost). The unpainted roof panel looks like brushed aluminum and yet is strong and durable.

Another styling change is the front grille that gives the front end a bolder, lower appearance. For identity reasons, the Imperial's well-known rear-end styling is virtually unchanged, although the bumper has been redesigned. Last year's very popular dummy spare-tire cover on the trunk lid is continued but now that Plymouth offers a similar option, it is expected that the plain trunk lid will become more popular with Imperial buyers.

Interior room is increased somewhat by a lowered floorpan in the rear-seat area. This required a minor frame modification and provides added legroom for rear-seat passengers.

Comfort is stressed as a 2½-inch foam-rubber padding is used on front and rear seats.

All models have the completely new Chrysler V8 of 350 horsepower and 413 cubic inches. This engine is approximately 100 pounds lighter than the double-rocker-shaft V8 it replaces and yet delivers more power at lower engine speeds.

Admirers of the soft, luxury ride will be pleased with the 11-inch tires on the 1959 Imperial. These tires, biggest in the industry, run on 16 pounds of air and smother road bumps like soft balloons.

Above, Imperial has a stainless-steel roof option this year. Its rear-end styling is much the same as previously. Right, heater controls are operated by these push buttons





THUNDERBIRD



AFTER A MOST successful year (37,892 were built), the Thunderbird has virtually no changes for 1959. Experts will notice that brightwork inside the grille is different as it is in the decorative insert behind the taillights.

Another minor change is that the instruments now have black numerals on white (last year, white on black). Natural leather upholstery is optional this year for the first time.

Coil springs have been replaced at the rear by leaf springs, making track bars unnecessary and providing more dampening action due to friction characteristics of leaves. Ride and handling are said to be improved by the change.

Engines are a 352-cubic-inch V8 of 300 horsepower and an optional 430-cubic-inch V8 (probably from Lincoln).



CORVETTE



CHANGES are minor in the 1959 Corvette, the car that proves Detroit can build a top-drawer sports car when it really wants to.

Engines are unchanged from 1958 with horsepowers ranging from 230 to 290, no small feat with a 283-cubic-inch engine. Radius rods have been added to the rear suspension to resist axle-housing torque reactions. Brakes now have better cooling and an optional lining gives superior antifade characteristics. The optional four-speed transmission has a manually controlled reverse-gear lockout.

Styling changes are limited to the removal of those washboard ribs from the hood and interior refinements which include a stowage bin just below the passenger's grab bar. Seats have been contoured for more "bucket" effect. Brightwork on the rear deck has been removed. Brake-lining area has been increased by wider brake shoes at the rear.

RIDING A wave of success, American Motors offers 1959 models that are only slightly changed. A new rear door eliminates last year's awkward junction of tailfin and door panel.

The front grille is new



RAMBLER • AMERICAN

and is die-cast in two pieces to minimize repair bills if it is damaged.

Economy of operation continues to be of major concern. The 127-horsepower Six has a glass carburetor bowl to permit accurate checking of float level. Available is a dual-throat carburetor to increase horsepower to 138.

The Rebel V8 has 215 horsepower, unchanged from 1958 while the Ambassador V8 develops 270 horsepower.

Revived is the American two-door station wagon. The American two-door sedan is continued. Both are up-dated versions of the 1955 Rambler.

Separate front seats are available at extra cost so one seat can be moved forward while the other is pushed back. A removable headrest makes sleeping in the reclining seats easier than ever.



Top, Rambler four-door hardtop and under it the Ambassador station wagon. Notice the less abrupt rear-fin line. Below, the revived American wagon



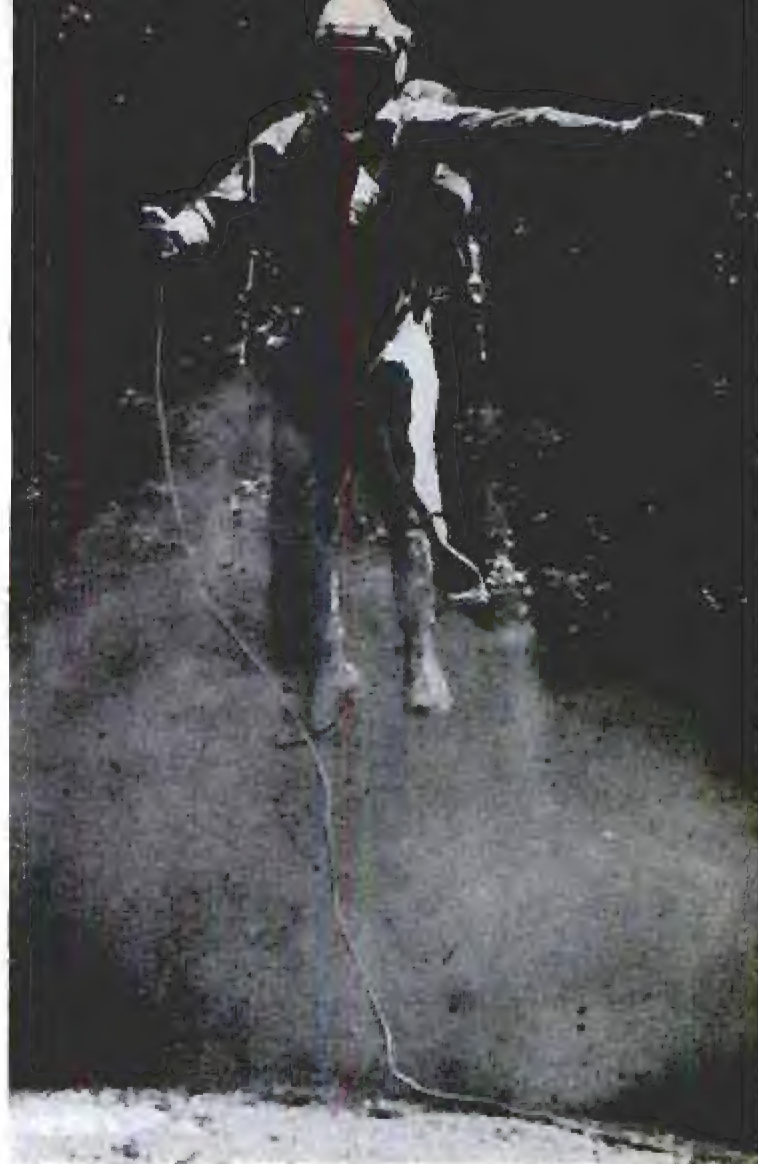
Headrest for the separately adjustable front seats looks like a you-know-what

Glass bowl of the economy carburetor (shown here with air filter removed) permits the mechanic to adjust float level accurately



What Is and What Isn't New for 1959

ENGINE	CHASSIS	STYLING
AMERICAN —No change	No change	Two-door sedan revived. Sedan model unchanged.
BUICK —LeSabre: Higher compression; displacement unchanged. Others: Bigger bore, longer stroke, higher compression.	New frame, air bags at rear only, improved brakes, easier steering, redesigned track bar.	All-new body. Longer, lower, wider. A completely new Buick personality.
CADILLAC —Higher compression, bigger displacement due to longer stroke. Improved automatic choke.	Modified frame, easier steering, improved shocks, transmission simplified by dropping rear pump.	All-new body. Little (if any) longer, but lower, wider. Front has Caddy image, rear has spaceship look.
CHEVROLET —Six has been detuned for more economy. Two V8s unchanged; 11 to 1 compression optional—industry's highest.	Longer wheelbase, modified frame, easier steering, brakes improved, air suspension optional.	All-new body. Longer, wider and lower. Completely fresh personality.
CHRYSLER —All-new V8 of single-rocker-shaft design. Bigger displacements, more power, lighter weight.	Frame unchanged. Air bags optional rear only. Torsion bars shortened and thinned.	Front and rear changes. Body shell retained. New roof offset adds rear-seat room in hardtop.
DE SOTO —Displacements up, bores increased, compression unchanged. Valves larger on two big engines.	Frame unchanged. Air bags optional rear only. Torsion bars shortened and thinned.	Front and rear changes. Body shell retained. New hardtop roof improves rear-seat room.
DODGE —Six unchanged. New V8 added for Coronet. Others have enlarged version of previous engine.	Frame unchanged. Air bags optional rear only. Torsion bars shortened and thinned.	Big change in front. Body shell retained. Rear-seat legroom in hardtop increased.
FORD —All engines unchanged except compression lowered for more economy on regular gasoline. Power down some.	Frame unchanged. Air suspension no longer available. All models on 118-inch wheelbase.	All-new body. Slightly longer, lower and narrower. Retains Ford personality.
IMPERIAL —All-new V8. Bigger displacement, more power, less weight.	Minor frame changes to fit new floor pan. Torsion bars redesigned. Air bags optional rear.	Front end restyled. Body shell retained. Improved rear-seat room. New stainless-steel roof.
OLDSMOBILE —Eighty-Eight unchanged, others restroked for more displacement and power. Automatic choke improved.	Major changes in frame. Wider tread, "98" wheelbase down slightly, others up slightly. Brakes improved.	All-new body. Now "98" has larger interior than others. Trunks bigger. Bodies longer, wider, lower.
PLYMOUTH —Six cylinder unchanged, standard V8 also. Power-option V8 has more displacement, bigger bore.	Frame unchanged. Air bags optional rear wheels. Torsion bars shortened, and thinned.	Important front and rear styling changes. Body shell unchanged. Interiors new.
PONTIAC —Displacement up sharply by increased stroke. Power range from 215 to 345 hp. Economy V8 offered.	Modified frame. Wheelbases unchanged. Tread wider by almost five inches. Brakes enlarged.	All-new body, all-new personality. Longer, wider and lower.
RAMBLER —All engines unchanged except for economy carburetor on Six.	No change	Front grille restyled. Rear doors redesigned.
CORVETTE —No change	Radius rods added to rear suspension. Brakes much improved.	Almost unchanged. Some bright-work removed, ribs taken off hood. Interior refined.
THUNDERBIRD —Standard engine unchanged. Optional 430-cu.-in. V8 available.	Leaf springs replace coils at rear. Unit body continued.	Minor trim changes only both inside and out.



Foot Soldiers Get Big Boost From Rocket-Powered Jump Belts

Even the infantry may be rocket-propelled in the near future. Rocket-powered jump belts being tested would enable a foot soldier to leap from a landing craft to cover

or to jump over a pillbox. The rocket nozzles (arrows) don't interfere with the soldier's actions. But they help him leap 20 feet with a 50-pound pack on his back.

Balance Weights Hidden by Hubcap

Tire-balancing weights, normally crimped to the wheel rim, can now be concealed beneath the hubcaps. Two weights slide between two concentric rings in a holder that is bolted to the wheel by the regular lugs. Wing-nuts lock the weights in place when the location needed for balancing has been determined by a static-balance test. Once the setting is determined by the test, the balancer can be removed and reinstalled without retesting, as is necessary for tire changes.





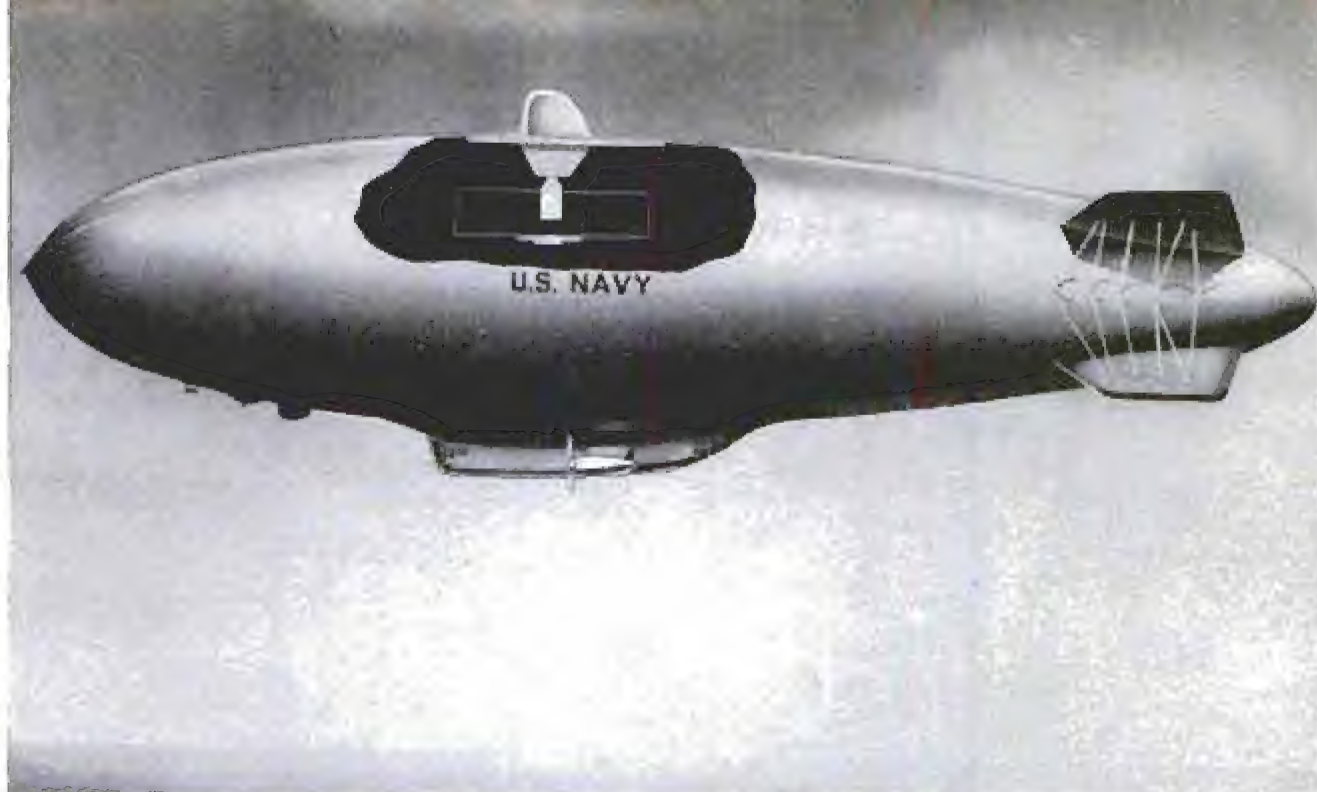
Goodyear photo

The world's largest nonrigid airship, the ZPG-3W, is shown above Akron on its maiden flight last July

Who Said the Blimp

The three airshipmen at left observe the search radar while the man at the scope looks for air contact
Official U. S. Navy photograph





"Bump" on top of blimp houses height-finder antenna. Horizontal antenna (cutaway) scans 360-degree horizon

Reprinted "PM Highlights"

By

Walter E. Burton

IT LOOKS AS IF the airship, which has been regarded by some persons as the problem child of the Air Age, is going to survive the newer Electron-Missile-Atom Age. In fact, there are many who believe that it is just now reaching its greatest potential as a military device—that conceivably a lone blimp on a dull patrol mission over a stormy sea could save America from surprise attack.

The airship of today—there are dozens of them in use—is, in numerous ways, vastly different from those in the public eye a generation and more ago when lighter-than-air history then being written by the airships *Akron*, *Macon*, *Graf Zeppelin* and *Hindenburg* was often tinged with tragedy.

So far as is known on the footlight side of the Iron Curtain, there are only two places in the world where airships are being produced. The principal builder is Goodyear Aircraft Corporation's plant in Akron, Ohio. Recently two blimps for commercial purposes were reported under construction at Friedrichshafen, Germany.

There are a number of bases from which blimps are flying, for the nonrigid airship is a part of the defense ring that watches for hostile actions. Such lighter-than-air watchdogs are operated by the United States Navy. In addition, Goodyear still uses a blimp or two for commercial flying—advertising, aerial photography, passenger

carrying and sometimes police work. There are no rigid, or true Zeppelin-type, airships in use.

The 10 days from January 15 to 25, 1957, brewed just about the ugliest weather seen in 75 years along the New England coast. By coincidence, this was the period and locale chosen to test the weather endurance of ZPG-class patrol blimps. In a sea area 200 miles off Boston, each participating airship, loaded with radar gear and other equipment, was on duty 24 hours at a stretch. A sandstorm was just about the only type of weather phenomenon the blimps did not encounter. They fought mile-a-minute winds, rain, sleet, snow, fog and ice. Yet not a single minute was lost from the patrol schedule, and no ship was unable to complete its mission—even though, during the test period, there were times when all heavier-than-air traffic was grounded in the region.

The success of this test led to an even more ambitious one. Two months later, a Goodyear ZPG-2 patrol blimp, carrying nearly one million cubic feet of helium gas in its bag, made a continuous flight, under power, for 264.2 hours (11-plus days) from South Weymouth, Mass., across the North Atlantic to the European coast, southward along Europe and part of Africa, then back across the South Atlantic to Key West. Total travel was 9456 miles—all without



Crewmen of a ZPG-2W take it easy between watches. Blimps move smoothly, experience few bumps and jerks

refueling. Chief complaint of the crew, composed of members of a test unit of the Office of Naval Research, was that there were no facilities for showers or baths aboard!

An early warning airship is jammed with equipment of all kinds. Here a crewman loads a marker flare



Last July the ZPG-3W, first of a new and larger class of nonrigid airships for airborne early-warning picket patrol, made its maiden flight in Akron. The largest non-rigid airship ever built, the ZPG-3W is about 50 percent larger than the ZPG-2.

The new airships being built at Akron have to be large, for they will carry the heaviest array of radar equipment ever sent into the skies to watch for possible invaders. Each ship will hold 1.5 million cubic feet of helium, 50 percent more than the capacity of the biggest blimp that had previously been in service; and it will be close to two city blocks long.

The modern nonrigid airship is as different from its ancestors of 25 to 30 years ago as is the modern automobile in comparison with cars of that period. Here are some of the airship's advances, as outlined by Goodyear Aircraft officials:

The Bag, or Envelope. Research has been going on constantly in an effort to improve the rubberized fabric used for confining the gas that gives the airship nearly all its lift (some aerodynamic lift is produced by rapid movement of the bag through the air). For a while after the last World War, rubberized three-ply cotton was used, then was replaced by less heavy two-ply cotton. Now cotton has given way to synthetic



Last year a blimp similar to this ZPG-2W set a record by flying 11 days nonstop, without refueling

fabrics. A rubberized Dacron envelope (two-ply) weighs, per unit area, only about 60 percent as much as a three-ply cotton type, 75 percent as much as two-ply cotton. For some reason not yet fully understood, the Dacron bag material has a remarkable ability to hold helium—so much so that, in a year's time, helium needed to replace that lost by diffusion and other causes equals no more than a single filling of the bag. The Dacron bag material is said to be so strong mechanically that an inch-wide strip can support two overweight men.

The Car. In earlier days, a blimp car was a fabric-covered tubular-steel affair. Now it is of airplane-type construction, made largely of a "sandwich" material consisting of two thicknesses of 0.008-inch sheet aluminum having between them $\frac{1}{4}$ inch of either balsa wood or aluminum honeycomb. The cabin of a ship such as a ZPG-2 has two decks. The lower one is the work level, and contains control equipment and electronic and other military gear. The upper level is occupied by living quarters. To reduce the boredom of long flights, designers have tried to provide most of the comforts of home — food freezer, well equipped galley, a wardroom for cards and other relaxation. Living compartments are finished in gay colors.

Power Plants. The two engines are of latest-design reciprocating type, are gasoline-driven and so mounted that they can be serviced and repaired in flight. They drive variable-pitch propellers that can be instantly feathered or reversed. The pilot of today's airship no longer has to worry about prop control: He sets his engines for a certain speed, say 1600 revolutions per minute; then automatic controls alter the propeller pitch so that the engine speed remains constant no matter what the ship's speed requirements.

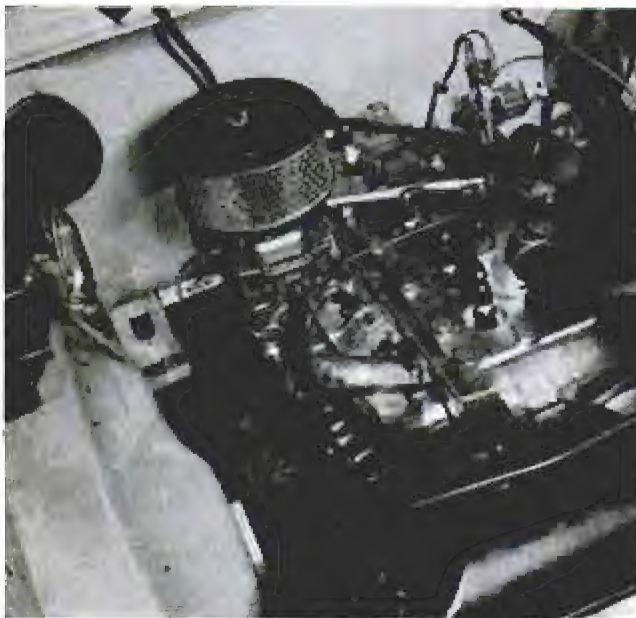
Likewise, other ship controls have been given the pushbutton treatment. The modern blimp has "power steering," for servo-mechanisms move the tail-control surfaces: No longer does the pilot have to spin an elevator-control wheel or tug to move stubborn cables. Nor does he have to be constantly concerned with pressure inside the helium bag. He merely sets a dial for the pressure desired, such as two inches of water. A newly developed device then automatically maintains this pressure within a tolerance of .050 inch of water. Because blimp pilots often are also airplane pilots, standard airplane controls and instruments are used wherever possible, and are grouped as on airplanes.

(Continued to page 248)



Hardtop illustrates the functional, yet attractive, lines of the Lark. Grille beside lights is heater intake

STUDEBAKER



WHAT DO YOU want in a new car? A home away from home? A place in the sun? Fins and flash to make neighbors bug-eyed? If so, the Studebaker Lark is not for you.

But if you want a vehicle that seats six in nonluxurious comfort, that parks in the garage and still leaves room for bikes and garden tools, that is designed for low first cost, low operating costs, then you'll be interested in the Lark.

It's small. Over-all, only 175 inches. That's less than 15 feet and it makes a 20-foot garage look like an airplane hangar. Overhang is 26 inches in front, 40 inches in the rear, about a foot less than most cars

Studebaker's flat-head six is not revolutionary, nor complex (back-yard mechanics will be glad to know)

Front and rear bumpers are interchangeable, so are left and right taillights. This is the four-door sedan





Two-door sedan is lowest-price Lark. Door and center post are only recognizable carryovers from last year

in front, nearly two feet less in the rear.

Inside it is surprisingly roomy. It seats six in reasonable comfort. You won't rattle around in it, but there are few new cars that seat six in comfort these days. This one has better midseat comfort than most.

Two engines are available. The L-head six with 169.6 cubic inches develops 90 horsepower. The V8 comes in two versions: A 180-horsepower model with dual-barrel carburetor, and a 195-horsepower model with four barrels. This latter is a bomb and pushes you deep into the cushions when you floor the throttle. It will hit 100 without fuss, if you're interested. Most people aren't these days.

But Studebaker isn't selling canned heat. It offers sensible transportation as it fights back with what it feels a growing number of buyers wants.

Styling is carefully thought out to reduce repair costs. All fenders bolt on, for example. Front and rear bumpers are inter-

Trunk is not voluminous, but is adequate. Spare lies flat. Fenders bolt on (three bolt holes are visible)



Simple dashboard is easy to read. Smaller body seems much tighter, more stable than previous Studebakers

Gas goes here. Trunk's high sill may be awkward when loading, but it's an important structural part





Station wagon has 113-inch wheelbase, 184.5-inch over-all length. Other models share 108.5-inch wheelbase



Small as it is, the wagon can be bought with a rear-facing third seat that folds down into floor when not being used

changeable (dealers like this). Tail-lights, too, are interchangeable, left and right. Chrome is noticeably absent. The grille is simple and easily replaced. There isn't even any hood ornament. The only brightwork is a strip that runs around the body to protect the paint in close parking and also to hide body joints.

By chopping off most of its overhang, Studebaker proves the old law of the vibrating reed—the shorter the reed, the less the vibration. The shortened car is tight and rattlefree.

Steering is easy and precise. The brakes are excellent.

The Six has a new combustion chamber design, increased compression (8.3 to 1) and a shorter stroke. Carburetors are new on all engines.

Economy should be around 25 miles per gallon although PM makes no tests of preproduction prototypes, preferring to test the car *you* buy instead of a hand-built model.

Studebaker continues the Hawk line in the coupe. It has the same engine choices as the Lark. ★ ★ ★

Still available is the Silver Hawk coupe. Reclining seats are optional on this and all Lark models this year



Plane Tilts Wing To Take Off, Land

Vertol Aircraft Corporation's Model 76 tiltwing craft takes off and lands like a helicopter and flies forward like a fixed-wing plane. The tilt-wing concept could eliminate the need for many large airports, for planes designed on this principle can operate from heliports or from unimproved plots of ground. It is believed that future versions of the Vertol tilt-wing craft will be able to attain speeds in the 350-450-miles-per-hour range. This would give the tilt-wing plane a decided advantage over the helicopter, with its current speed record of 162.7 miles per hour. Military tilt-wing craft could be used as fast assault transports and for observation, reconnaissance and rescue missions.



Anglers Find Fish by Listening to Their "Conversation"

Anglers now can find fish by eavesdropping on them. Using a new hydrophone, the angler can listen to fish "talk." Research indicates that each species of fish makes a characteristic sound, according to the manufacturer. The fisherman lowers the hydrophone into the water, listens on earphones, and drops his hook at a favorable spot.

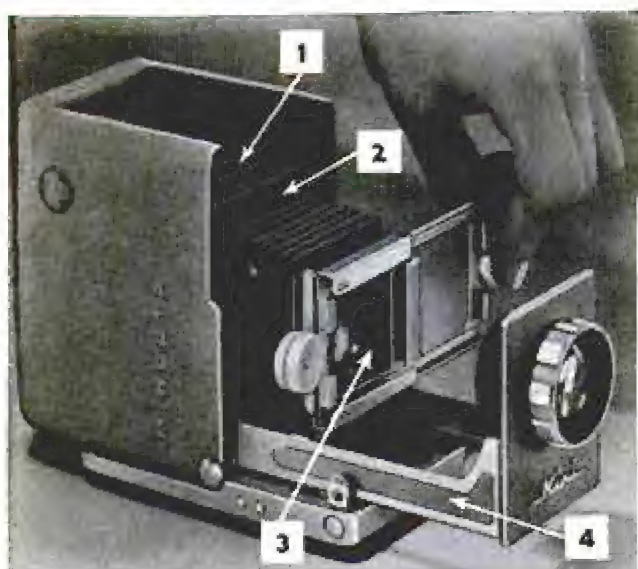




EASY LOADING CAMERA, above, eliminates problems of threading 35-millimeter film. The film cartridge is dropped into place and the leader is injected into the take-up chamber. Camera has $f/2.8$ lens
Eastman Kodak Company, Rochester 4, N. Y.

SOLAR-POWERED RADIO, left, has tiny silicon wafers in top of case to convert sunlight into electricity. It will operate indoors under light of a 100-watt incandescent bulb, or on a four-volt mercury battery
Hoffman Electronics Corp., 3781 S. Hill St., Los Angeles 7, Calif.

Shop Here



TURTLE CLOCK, above, has "educated" plastic turtle that points its head at correct time as it floats on water-covered dial. Gold anodized aluminum case contains jeweled eight-day clock movement. Magnets cause turtle to follow concealed arm of the clock
Swiss Harmony, Inc., 844 W. Adams St., Chicago 7



POCKET-SIZE PROJECTOR has wide-angle lens that makes a big picture. It unfolds like bellows-type camera from light-shielding case, 1. Condenser holder, 2, is behind condenser lens, 3, which moves on rail, 4. It accommodates either film strips or slides
FR Corp., 952 Brook Ave., New York City 51

ELECTROSTATIC AIR PURIFIER removes up to 95 percent of pollen, dust or smoke particles in the room. Three-speed fan circulates air past a removable and washable filter which attracts particles from air electrically. Unit also can be set in window
Coolerator Div., McGraw-Edison Co., 704 N. Clark St., Allston, Mich.



CARD SHUFFLER breaks up as many as three decks of cards and deals from two to six hands. Dealing is controlled by plastic knob as unit is revolved. To change the number of hands, a small lever is reset
 Dayo Products Co., 206 S. Orchard Ave., Dayton, Ohio

SKEWER SUSPENSION for indoor or outdoor barbecues allows radiant heat to penetrate meat as torsion cord winds and unwinds. Reflector is adjustable to speed cooking. Up to 25 skewers can be attached
 Mrs. Dorothy Damar, 768 Damar Bldg., Elizabeth, N. J.



PORTABLE ELECTRIC ORGAN, developed in Europe for homes, small churches or outings, has a range of four complete octaves. The instrument produces a smooth rich tone and uses 110-volt house current. Carrying case has legs which form a table for organ
 M. Hohner Inc., 351 Fourth Ave., New York City 10

PHOTO SLIDE BINDER makes it possible to bind projection slides between glass in 30 seconds. The device binds with one-half inch adhesive tape. The edges and corners are sealed smoothly by rubber rollers. Rubber suction cups hold binder to any surface
 Mack's Industries, Inc., Waterloo, Iowa

PORTABLE DISHWASHER has a drop-leaf countertop that adds four feet of working area to a kitchen. The dishwasher can be rolled up to the table after a meal and loaded with dishes, then rolled back to the kitchen, connected to the sink and turned on
 Waste King, Corp., Los Angeles, Calif.





PORTABLE DRYER, above, is basically an electric space heater and room fan. But it also can be used as a hand or hair dryer, to speed up drying of paint and varnish, or used as a darkroom drying aid

American Refrigeration Export Corp.,
30 Broadway, New York City 11

BRIEF CASE BARBECUE grill will cook 50 hot dogs or eight steaks at a time. But it folds into a package only two inches thick. Half of the case is a charcoal firebox, the other half is a side table

K. G. Niblack Co., 100 Huntington Ave.,
Buffalo 14, N. Y.

Shop Here



ELECTRONIC FLASH unit for amateur photographers eliminates need for a separate power pack. All necessary components are built into the handle and lamphead. It works off three D-size batteries, or a.c. house current

Holland Div., Minneapolis-Honeywell Regulator Co.,
5204 E. EVANS AVE. DENVER, COLO. *Minneapolis, Minn.*

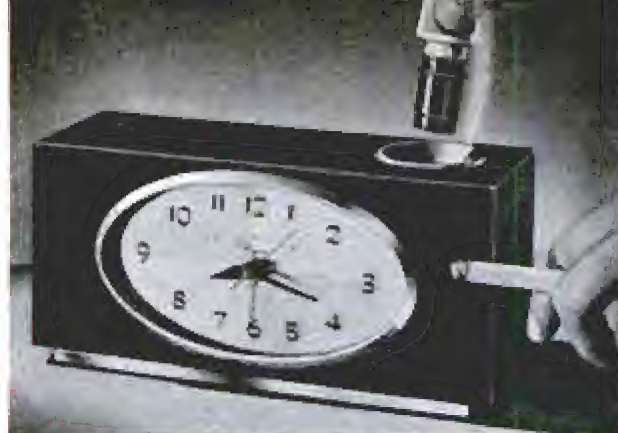
STEAK TESTER has a built-in red signal light that tells you when it's time to remove the cooked cut from the grill. You just dial your choice of well done, medium or rare, and adjust the device for steak thickness

Scott Thermo-Meter Corp., 1195 Brooks Ave., Rochester 10, N. Y.

PHOTOENGRAVED CUFF LINKS are made from your own favorite snapshot or drawing. The exact details of the picture are reproduced on a metal surface one inch square

Gray Products, 2037 Maycrest Ave., South Pasadena 2, Calif.





ELECTRIC LIGHTER is built into the top of electric clock and uses house current, stepped down to six volts. Like a car's dash lighter, it draws power only when heating. It's equipped with safety fuse

The Ingraham Co., Bristol, Conn.

SOLAR STOVE develops a temperature of 400 degrees in five minutes. On a clear day, the metal and plastic unit will cook four hamburgers in less than 10 minutes. The only fuel needed is sunlight

Philito Corp., Salem, Mass.



for Christmas

SERVING CART folds flat when not in use. The cart is finished in black enamel and gold anodized aluminum. It has room on two trays for food and dishes for small garden or patio parties, or for indoor buffet meals

Pringle, Inc., Rochester 10, N. Y.

SLIDE-RULE WATCH has standard watch dial with sweep second hand plus a built-in circular slide rule that can be used for multiplying, dividing, figuring interest or percentages. Slide rule dials are turned by knobs

Wakmann Watch Co., Inc., 15 West 47th St., New York City 36





BATTERY-DRIVEN CAR has aircraft-type steering wheel, forward-reverse switch, hand brake and foot throttle. Car carries 250 pounds of children or parents

Grimt Piston Ring Co., 241 N. Westmoreland Ave., Los Angeles 4, Calif.



SATELLITE TRAIN holds "moon" in orbit above launching platform as it travels O-gauge layout. Has radar, searchlight cars, "space research" caboose

Kusan-Auburn, Inc., Nashville, Tenn.

Shop Here



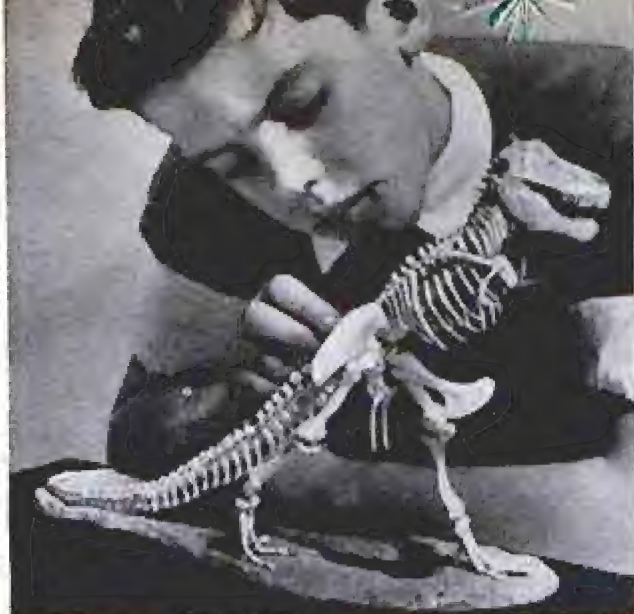
MOON ROCKET is built from plastic model kit which includes a launching pad with movable arms, a detailed cockpit with three "spacemen" and two ground crewmen. Finished model is 14 inches high. Its three stages can be separated for a simulated flight

Revell, Inc., 4223 Glencoe Ave., Venice, Calif.

WORKING MODEL of the Navy's TBF Avenger features a revolving gun turret with a machine gun that swivels, retractable landing gear, folding wings and a bomb bay that releases a torpedo. Parts of kit were copied from Navy's original blueprints

Monogram Models, Inc., Chicago 32
3421 W. 48th Place.





BUILD-IT-YOURSELF DINOSAUR is assembled from kit of 46 plastic pieces. Finished 16-inch model is lifelike replica of huge reptile
Ideal Toy Corp., 200 Fifth Ave., New York City 10



ROCKET LAUNCHER duplicates firing procedure of Army's earth satellites. Set includes motorized launching tower, illuminated control panel and rocket with foam-plastic nose
The Lionel Corp., 15 E. 26th St., New York City 10

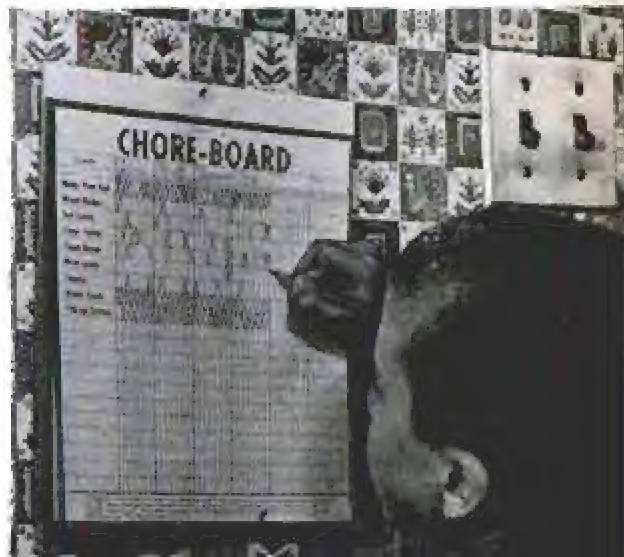
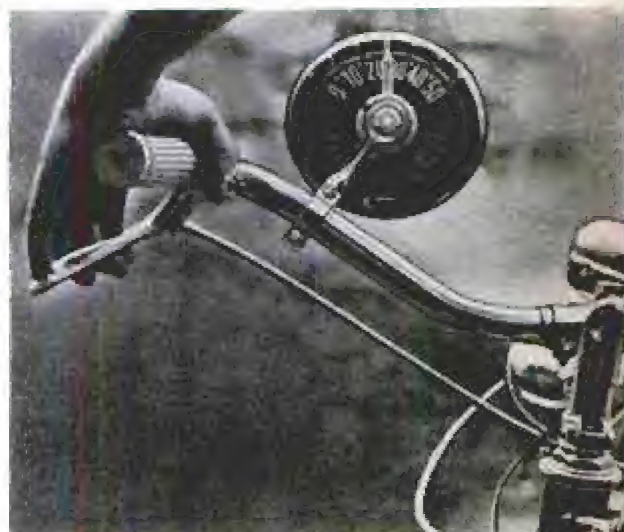
or the Youngsters

BICYCLE SPEEDOMETER works by air pressure on same principle as aircraft speed indicators. Orifice at front of instrument allows entry of air which blows against fan blade to move spring-mounted needle on dial. Back of instrument is "taillight red" plastic
Sinko Mfg. & Tool Co., Chicago 31

MINIATURE BOWLING GAME challenges your ability to score strikes and spares on an area about the size of a bridge table. The pins and ball are made of hard wood. You swing ball, suspended on a chain from an overhead boom. Scoring is same as in regular bowling
7310 W. WILSON AVE.
Deli-Corps., 2045 Cambridge Street, Detroit 10, Mich.

GROWING MIRROR was inspired by custom in many families to measure height of children on a wall or door. Frosted edging at side of mirror has half-inch calibrations up to five feet and space to mark child's growth. Marks are removed with damp cloth
Dunnell-Kelley Glass Co., Holland, Mich.

CHILDREN'S CHORES can be posted on a tablet form designed for easy hanging in the kitchen, den or youngsters' rooms. Intended to instill dependability at a tender age, chart lists such items as "Clean Room," "Brush Teeth" and space for small fry names
The Patrick Co., 734 15th St., N.W., Washington 5, D. C.



Fighting the Fire Ant

By John Krill

BACK IN the 1920s, a ship from South America docked at Mobile, Ala. Besides discharging her cargo, the vessel discharged a group of insect passengers which were destined to become a major headache. The insects were fire ants. Hated and feared by all animal life, the fire ants also devoured and destroyed vegetation. They found the new land much to their taste and multiplied at a prodigious rate. So widespread has the pest become that Congress has ordered the Department of Agriculture to take control measures.

Individually, the fire ant is insignificant in appearance. It is about one fourth inch long and reddish in color. Its bite stings like the burn from an ember. On humans the sting causes painful boillike sores.

Using the same unspectacular pattern that allowed it to gain a foothold in Mobile, the fire ant ranged far and wide until it was established in nine Southern states. The pests traveled on trucks, trains, cars and airplanes. They drifted on logs and debris in streams and rivers. They flew and they crawled as their numbers multiplied incessantly. After mating, the queens cast off their wings and started new colonies.

The pests invade homes and devour all meats, butter, bread, cheese and sugar;



Photos courtesy U. S. Department of Agriculture
Busy ants devour an unopened bud of an okra plant. Their big appetites also send them underground to attack potato crops

often they eat holes in clothing. Helpless wild and domestic animals are attacked. Newly born creatures unable to run are especially vulnerable. Voraciously feeding below and above the ground, the pests cause untold damage to vegetable crops such as corn, potatoes, okra, eggplant and melons. Forage crops, fruit trees and shrubs, nursery stock, grasses and cereal crops all fall victim to the ant's hunger.

They build great, hard-crustured mounds on lawns and cultivated lands. Where fields are heavily infested with the pests, farmers are finding it difficult to hire harvest workers. The ants attack man viciously. Small wonder then that field workers refuse to enter such areas. Control of the insects by individual property owners saw some preliminary success. But soon the pests began spreading at such a rate that individual effort was no longer an effective check. It was found that community action was needed for effective control of the fire ant.

Now federal action will insure control. Aircraft are being used in heavily infested agricultural areas. Hand application is doing good work in populated areas. The weapons are heptachlor and dieldrin. The battle will not be won with a single attack. It will take several years and the battleground will cover some 20 million acres.

Fire ants build large, hard-crustured mounds in cultivated fields. Mounds can make it impossible for farmers to operate mechanical equipment





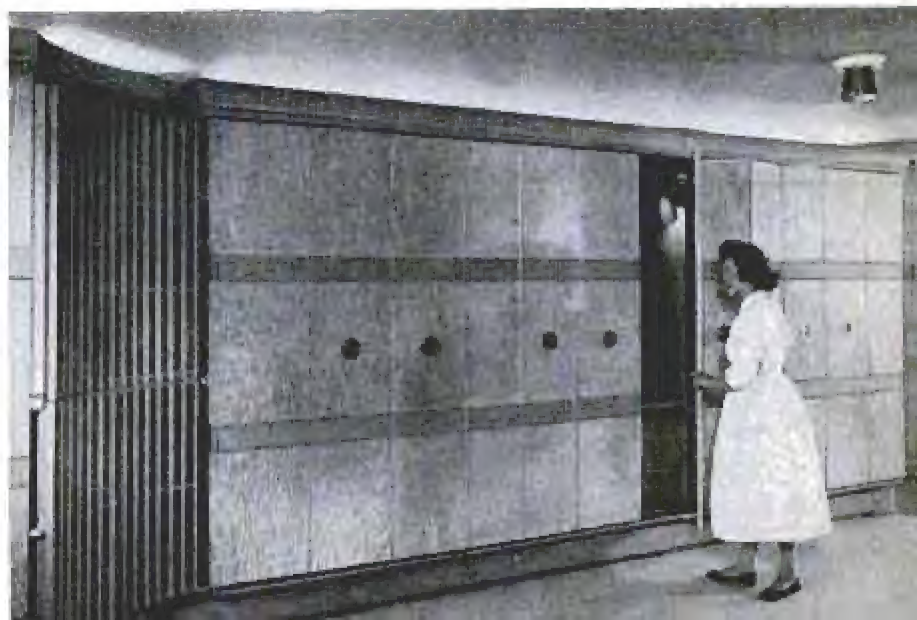
United States Plywood Corp., photos

"Hi-fi or TV?" This Glen Cove couple has a choice in the built-in entertainment corner of their family room

HOW CAN YOU CHANGE a modest home into a show-place? One young family who owns a \$19,000 home in Glen Cove, Long Island, N. Y., has the answer. It's built-ins for every room and almost every wall. Of course it helps if you are a Vienna-born cabinet maker and designer, but the Glen Cove do-it-yourselfer says that most of his projects can be built by a man with average skill. One of his most ingenious built-ins is a 16-foot wall unit in the family room which conceals the radio, TV and hi-fi sets, a complete sewing center, and a fold-up bed behind folded doors. The TV rests on a heavy-duty Lazy Susan bracket which slides out so the set may be viewed from any part of the room. Records are stored in a cabinet below the TV and the speaker housing is built behind grillwork next to the set. Drawers, a fold-out worktable,

A HOUSE FULL OF BUILT-INS

Folding doors of 16-foot storage wall in family room conceal TV, sewing unit, bed





In the boys' room, tracks for toy train are mounted on board which folds into wall, becoming chalkboard

ironing board and storage for 100 spools of thread on perforated panels are found in the 5½-foot sewing center. The wall bed has shelves and cabinets built into its compartment to provide storage space for bedding and a guest's belongings. The boys' bedroom features a two-tiered bunk bed with a third bed concealed in a drawer at

There's a place for everything around the 12-foot workbench. Perforated multileaved racks along the wall give access to tools



Out of this built-in rolls table to hold movie or slide projector; screen pulls down like window shade

the bottom. There's also a chalkboard that folds down from the wall to form a platform for a model train. An inconspicuous cabinet in the living room holds a motion-picture projector and screen. The projector is set in a custom-built table that can be rolled out, and the screen pulls down like a curtain. The basement workshop has

Owner demonstrates built-in guest room with fold-up bed and storage area in back



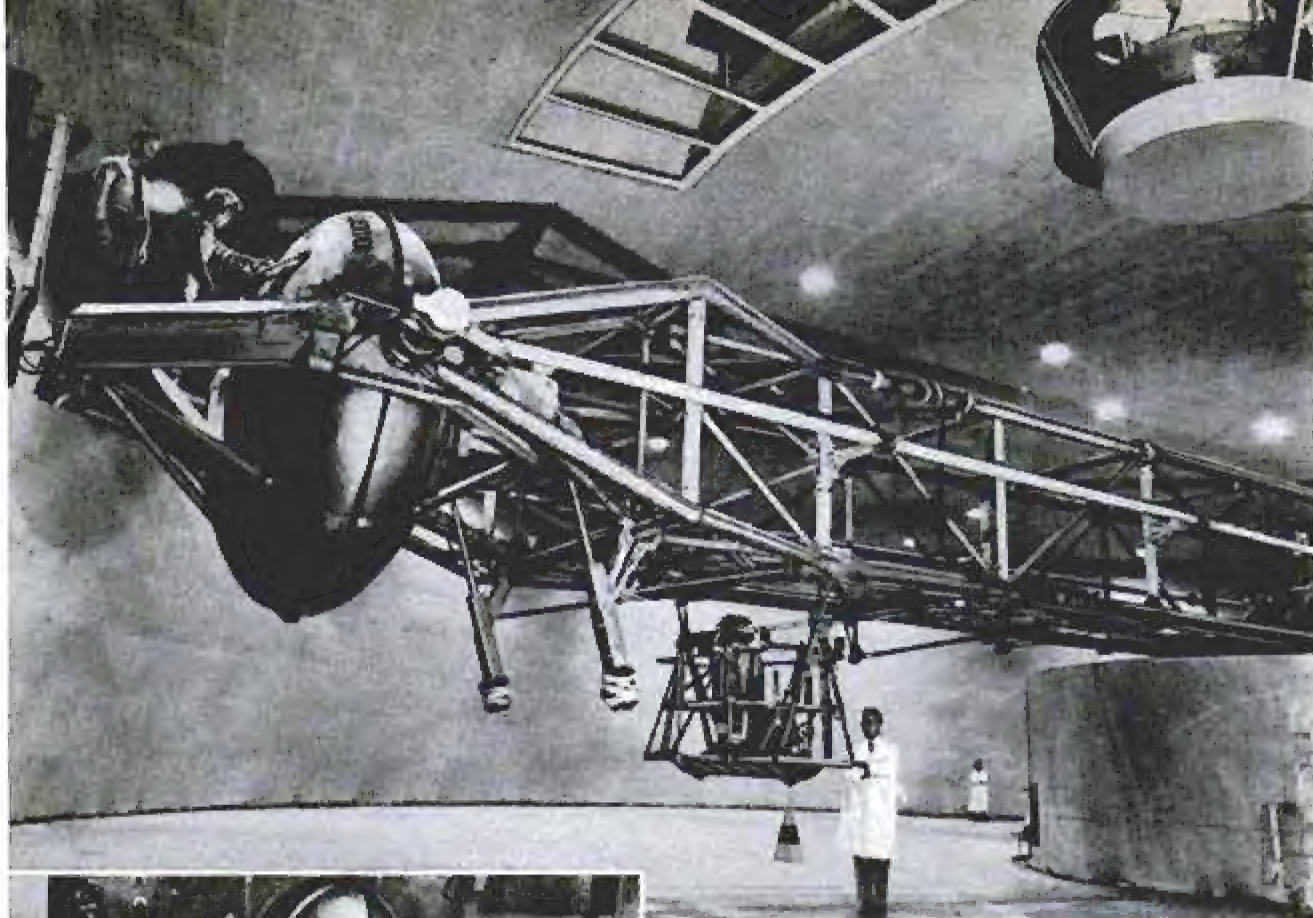


Drawer pulls out from beneath the bunk beds in boys' room to provide a third bed for young overnight guest

a 12-foot bench made of pine plywood with cabinets over and under the bench providing 60 cubic feet of storage space. A storage wall is built around the washer and dryer in the laundry, so all necessary articles are within a few steps. Floor-to-ceiling cabinets in the basement are used for summer storage of blankets and winter clothes. Among the other built-ins around the house are a hideaway refreshment bar, a 10-foot couch and end table combination, and a compact spare bathroom in a space $4\frac{1}{2}$ by 6 feet. Most of these built-ins are made of plywood and the paneling and facing are of United States Plywood Corporation's Weldwood panels in a variety of woods. ★ ★ ★

Built-in sewing center in family room is replete with fold-out ironing board and worktable, lots of storage space and a rack to hold thread





Centrifuge Tests Reactions To Rocket Flight

Man's reactions to the crushing forces of rocket flight are tested in a giant human centrifuge. The pilot sits inside a gondola located on the outer end of a 50-foot tubular-steel arm. He has a full complement of instruments and controls, and around him are devices for observing his physical condition. The gondola is tumbled end-over-end and sideways at various speeds and in many patterns. Cameras record how the pilot "sags" during "flight."



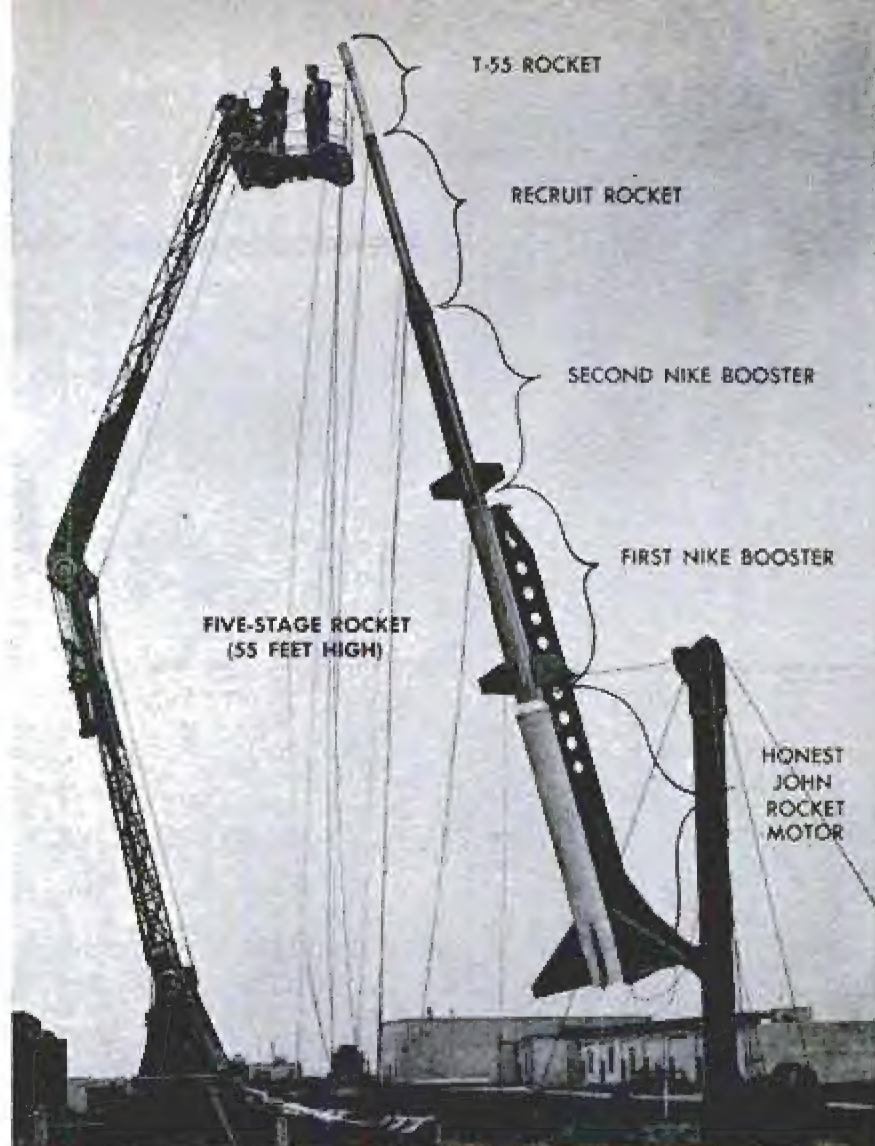
Safety Fan Vents Fumes

Air blows in the same direction, regardless of the direction of blade rotation, from a new, all-plastic fan. The cone-shaped blowers are being installed in some industrial plants because the design prevents accidental reverse flow of toxic fumes. Since it has no spark-creating metal exposed, the fan lessens the danger of fire or explosion from volatile vapors. The new fan is expected to replace propeller-type fans in some furnaces and air conditioners.



Model Rockets Probe Space Mysteries

Solid-fuel rockets are used to launch research models hundreds of miles above the earth in search of scientific knowledge. Models attain speeds as high as 11,000 miles per hour (Mach 16). Shock-resistant telemetering devices inform ground-receiving stations about such things as aerodynamic heating and stability. In a five-stage firing the first two rockets are fired early to gain altitude. Atmospheric re-entry facts are gained by delaying firing of the third stage until the vehicle has reached the re-entry angle. Stages three, four and five will then be fired to drive the test body at very high speeds through the atmosphere. The fifth stage contains the instrumented model, which usually tests a new design.



Eight-Jet Missile Bomber Can Span Oceans and Return Without Refueling

America's first missile-platform bomber, the Boeing B-52G, can span oceans and return to its U. S. base without refueling. The eight-jet, 450,000-pound bomber will carry two air-to-surface missiles that can be released hundreds of miles from their targets. Greater target altitude and climb

performance were gained by redesigning the wings, reducing the vertical stabilizer to 40 feet, 8 inches, and by using Pratt & Whitney J57-P-43W engines. Other changes from the original B-52 are the wing tanks, broader tail and hooded cockpit. The B-52G carries a bomb load plus the missiles.





This busy river boat on the Congo pushes two barges and also pulls two converted hulls filled with palm oil

STERN-WHEELERS PLY THE CONGO

By Lyn Harrington

PHOTOS BY RICHARD HARRINGTON

RUSHING FROM MOUNTAINS and meandering through swamps of the Belgian Congo, the Congo River is the outstanding river system of Africa. It carries much more shipping than the Nile. With its tributaries, the Congo provides some 9000

Congoese, their dugouts loaded with fruits and vegetables to sell, swarm over boat as it nears shore



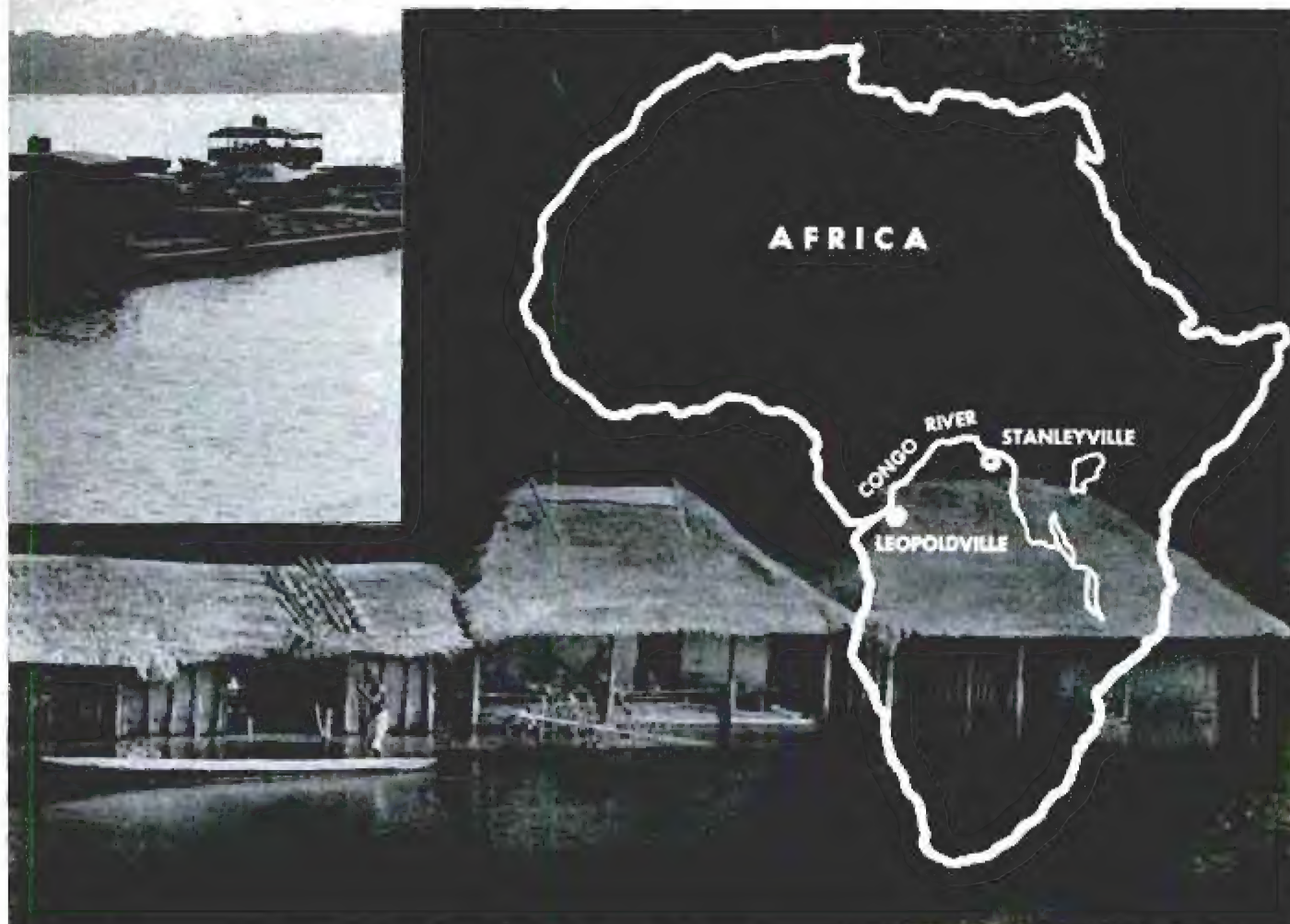
miles of navigable waterways, of which 2000 miles are accessible to vessels of over 800 tons.

River boats and barges transport passengers and freight into the hinterland, carry out other passengers and products of the interior, such as mineral concentrates, palm oil and forest products.

Between Leopoldville and Stanleyville, 1077 river miles, the Congo makes a great arc, twice crossing the equator. Where navigation is interrupted by rapids, a railway carries cargo around the swift water to the Upper Congo.

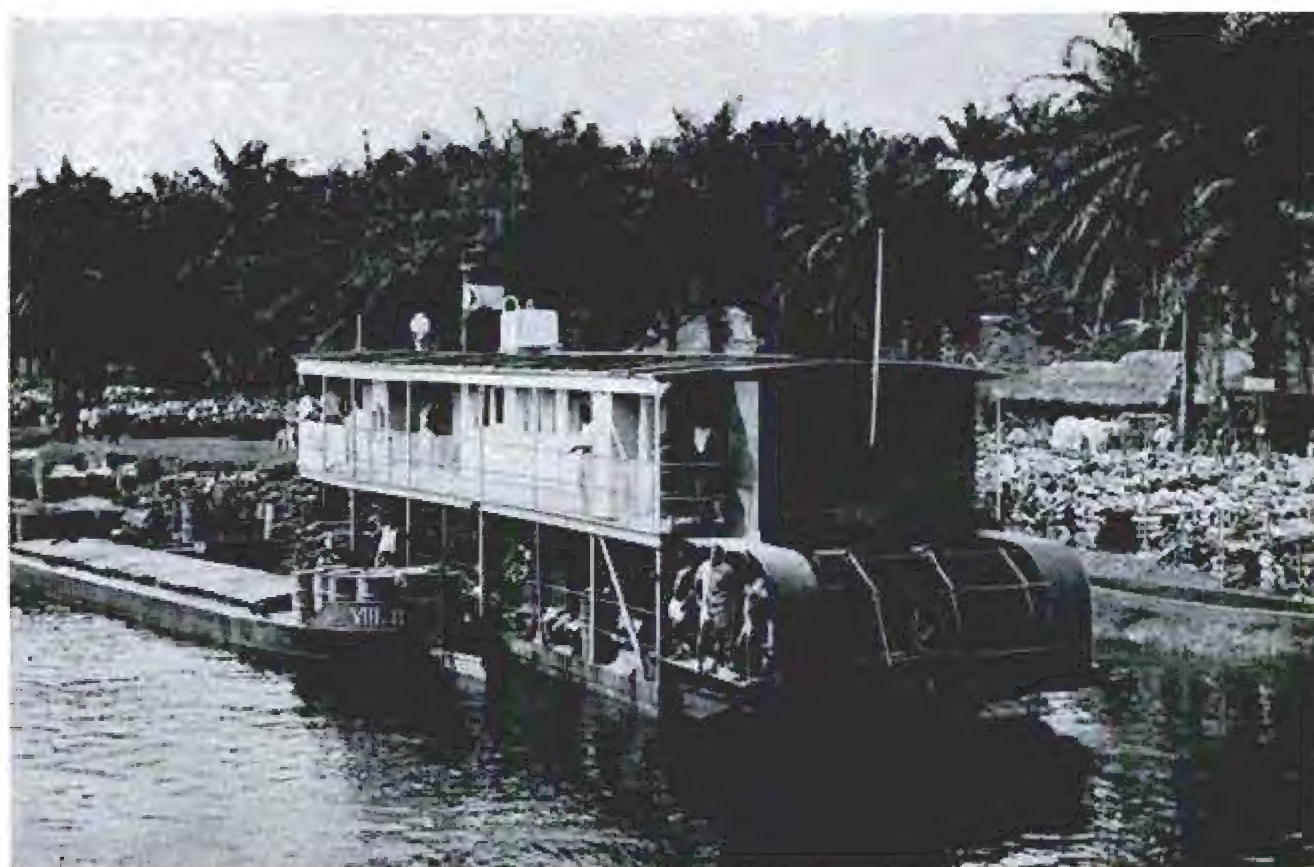
Otraco (Office Transport Coloniaux) operates the river network with true Belgian efficiency, in freight, passenger and personnel service. Powerful electric cranes load and unload freight at the river ports. The ships are equipped with radar and short-wave radio and, with the aid of powerful searchlights on the bridge, they travel day and night. There is weekly service up the Congo from Leopoldville to Stanleyville, and less frequent service up the tributary rivers, such as the Ubangi and the Kasai.

The Congo is a busy water highway, with big three and four-deck diesel-powered stern-wheelers pushing loaded barges ahead of them. Very few other craft are seen on the river, apart from the dugout canoes of the Congoese. For over 1000 miles the river twists and widens within its banks. The volume of water in the



By the end of the rainy season, the Congo floods the porches of homes along the river, and families keep dugouts moored to pillars of their houses for ready use. In dry season, crocodiles appear on the sandbars.

An older stern-wheeler pauses at a stop on the Congo to take on a load of wood, which is used for fuel. This boat is manned entirely by Congolese. In the background is a plantation where palm oil is produced.





The *Baron Liebrechts* docks at Lulonga to deliver freight and passengers. Stops along the river are very short

Congo does not vary greatly, although at the end of the dry season, sandbars show up, usually adorned with crocodiles and hippos.

At times, a stern-wheeler moves close enough to the Congolese houses for passengers to peer inside. Elsewhere the river widens to 20 miles. Africans paddle their dugouts to the boat, to sell fruit and cassava to the crew and second-class passengers,

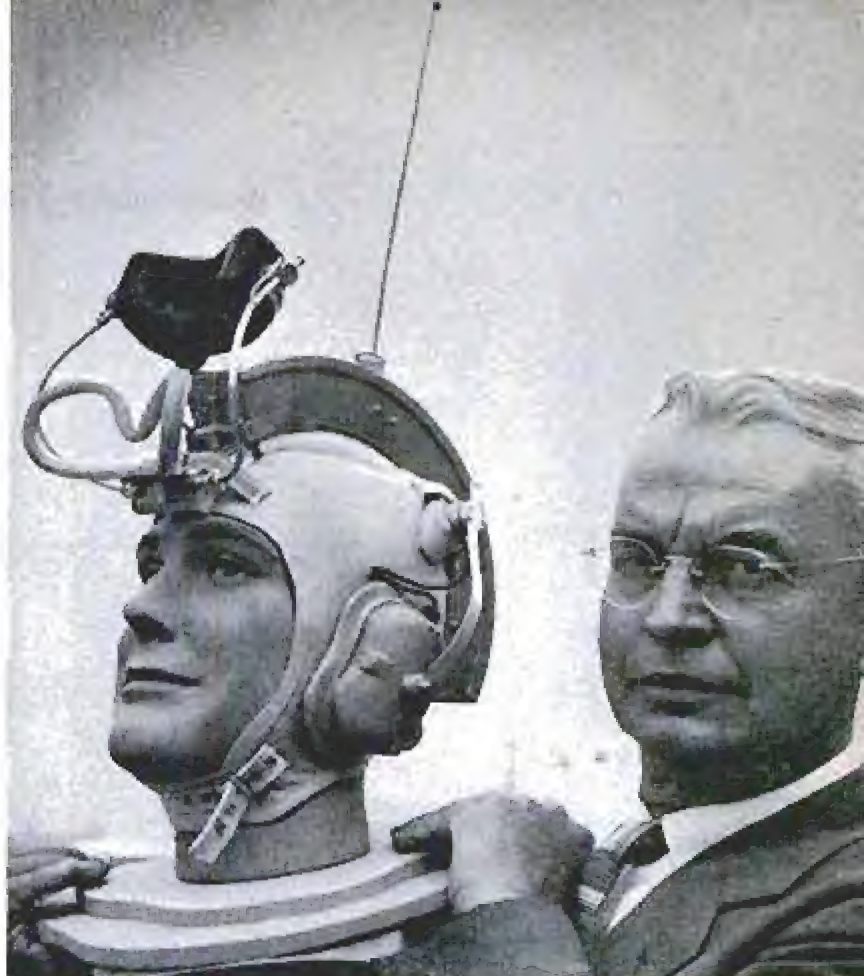
Congolese are employed wherever possible in river navigation and eventually become skippers of boats

or to buy smoked fish from the crew.

On the lower river, the ship encounters floating islands of water hyacinth, introduced to the Congo around 1950. This weed entangles itself around the propellers and is a nuisance to navigation. Eradicators are working on every tributary stream and, at Lisala, every river boat and barge is closely examined to make sure the weed is not being carried upstream. ★ ★ ★

Determined saleswoman brings cassava, wrapped in banana leaves, aboard a barge for sale to crew





"Roman" Radio Helmet for Jet Plane Handlers Shuts out Noise

Radio helmets that allow aircraft handlers to talk and listen even when nearby jets turn on their afterburners are being tested for use on the flight decks of aircraft carriers. The helmet is padded with plastic to reduce the impact of noise that sometimes exceeds 135 decibels and is intended to be worn with padded clothing that protects other parts of the body from the damaging effects of intense sound. A transistorized transmitter-receiver is contained in

a curved headpiece that clamps over the helmet and is immediately detachable for replacement when its self-contained batteries need recharging. The circuitry is equipped with an automatic noise-actuated volume control. The entire unit, which resembles the helmet of an ancient Roman gladiator, weighs four pounds and was designed by the Navy Electronics Laboratory at San Diego. It's intended for use in deck areas where jet noise is loudest.

Antique Clock Replicas Assembled From Kits

Authentic replicas of antique clocks can be assembled without special tools from kits of precut parts. The kit contains a preassembled electric-clock unit. The case parts are cut from furniture woods—cherry, maple, walnut or mahogany. One of the clocks can be built in an evening.





Milady Deftly Changes Costume Inside Umbrella

Now the sack look has come to beach umbrellas! Holding a new German-made umbrella above her head, milady unfurls

an opaque "bag" around her body. Then she performs deft operation of changing into her swimming suit—with one hand!

Tools Cut Auto Mufflers and Free

Muffler removal can be speeded with new pipe-cutting and heating tools. The cutter adjusts to pipes $1\frac{3}{4}$ to $2\frac{1}{2}$ inches in diameter. It leaves no burrs and can fit into tight spots. Its jaw opening is con-

Rust-Locked Pipes by Heating

trolled by the handle. The heating tool can free pipes locked to the muffler by rust, and it has a 1350-watt high-heat tubular element that breaks the rust weld in three to five minutes.





Plastic House Built in Japan

Japanese artist H. Igami believes that inexpensive houses will be built entirely of plastic in the near future. To prove his point, he constructed a home in Kyoto with plastic floors, ceilings, window sash, curtains and furniture. The house contains no steel, lumber or concrete. Igami reports the house is fireproof, quakeproof and moistureproof, easy to heat and to clean. Igami made even the kitchen utensils of plastic.



Danish Eggs Dated To Insure Freshness

Eggs in Denmark are dated weekly so that the buyer can tell whether they are fresh. The dating is done in egg-stamping plants under government supervision. An egg is stamped with a code number—like "Z3 45 67." The "Z3" is the code number of the egg exporter. The week in which the grading took place is identified by the "45," and "67" represents the station where the grading and packing took place.



Salt - Water

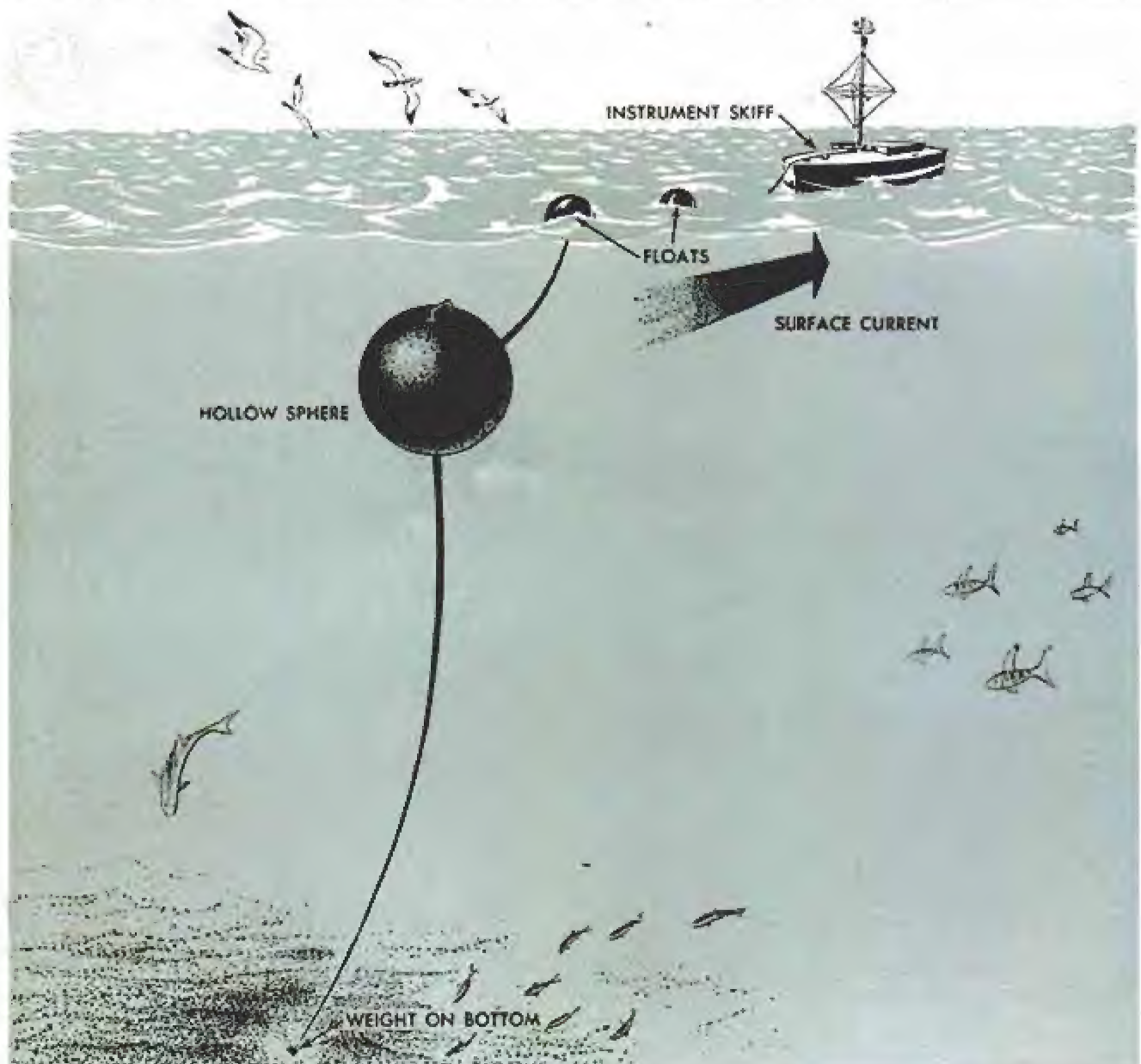
A NEW KIND of electric battery that uses sea water as its electrolyte is operating half a dozen robot-instrument stations anchored off the coast of Lower California. The batteries produce steady current for three months or more without service and are good for many additional months if the sea water is renewed occasionally during that time.

Not only do the batteries power the oceanographic instruments and recorders at each floating station, they supply the current for the steady white lamps and powerful strobe flashers that serve as warnings to shipping. A radar reflector on each station also serves to keep shipping away.

Each cell of the new sea-water battery contains two parallel plates, one of magnesium metal and the other of porous carbon. Sea water, or even salt water, is used as the electrolyte. Each cell delivers one ampere at one volt under load. The battery was developed by Dow Chemical Company and the Scripps Institution of Oceanography from original studies made by Manuel Sanz of North American Aviation.

Scientists at Scripps believe the battery will come into wide use for offshore and other remote locations where long-lived and relatively inexpensive power sources are required. They point out that a two-cell sea-water battery that weighs only a third as much as an ordinary two-volt

Drawing shows untended instrument skiff anchored in deep waters. Sea-water battery powers instruments



Battery

By Ewart Thomas

marine storage battery delivers 14 times as much energy before servicing or replacement is required.

The new battery isn't rechargeable. Instead, its magnesium anode is replaced when it has been consumed. More frequently, the electrolyte must be replaced so as to remove the sludge that builds up from the bottom of the cells. For its extra-long-life batteries, Scripps uses relatively huge electrodes in tanks that are deep enough to postpone the action of the sludge.

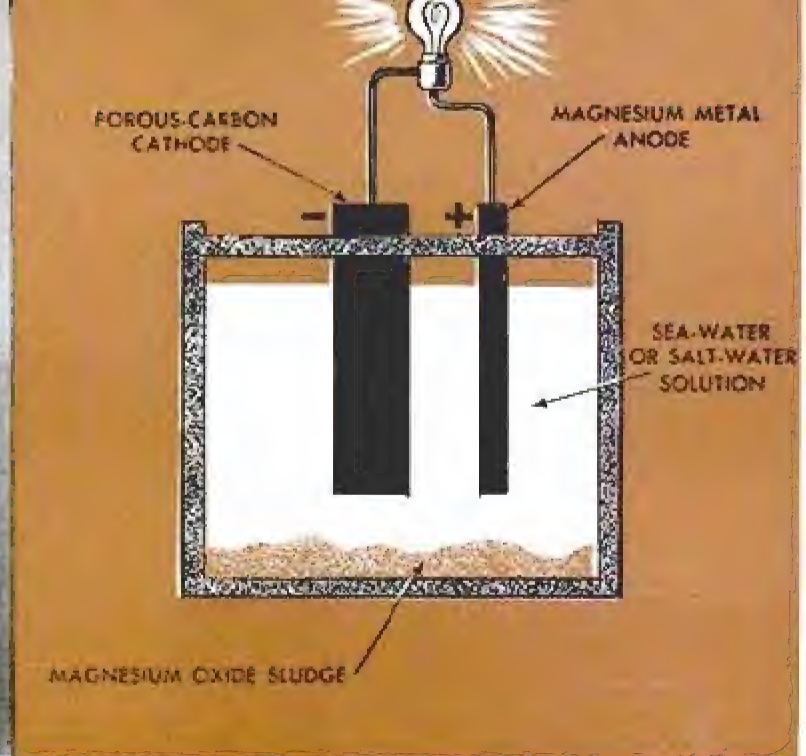
The battery is one of a family of batteries known as the air-depolarizing type. In this form, magnesium slowly goes into solution, producing hydrogen ions that travel to the

carbon cathode, thus creating the electrical current. However, the carbon surface would almost immediately become blocked, or polarized, by the hydrogen except for the fact that the carbon is porous. Air diffuses down through the carbon and yields oxygen that combines with the hydrogen to form water, allowing the electrical effect to continue. The battery literally breathes air and it is necessary for the upper end of the carbon cathode to remain dry and exposed to the atmosphere.

For convenience the battery elements are installed in waterproof wooden cases but in one experiment at Scripps a slot was cut into the hull of a small boat and the elements of a cell were fitted through

Technician rigs radar reflector on mast of skiff which serves as robot instrument station for oceanographers





Drawing shows elements of sea-water battery. Three-percent salt solution can be used instead of sea water

the hole, projecting down into the ocean. The cell worked perfectly. In another experiment the investigators placed six groups of elements in series in a slot in the hull. A full six volts was not obtained due to partial "internal" shorting in the ocean water, though the power loss was reduced to some extent by placing wide plastic partitions between the pairs of elements.

The type of magnesium known as tooling plate is commonly used as anode ma-

terial and is generally available. Porous carbon is not on the general market. It is available, however, in the form of the special cathodes used for such air-depolarizing cells as National Carbon's CG-500 railway signal battery, and for air cells used to power rural radio-telephone circuits. In place of sea water an electrolyte consisting of a three-percent solution of common table salt in ordinary water works very well.

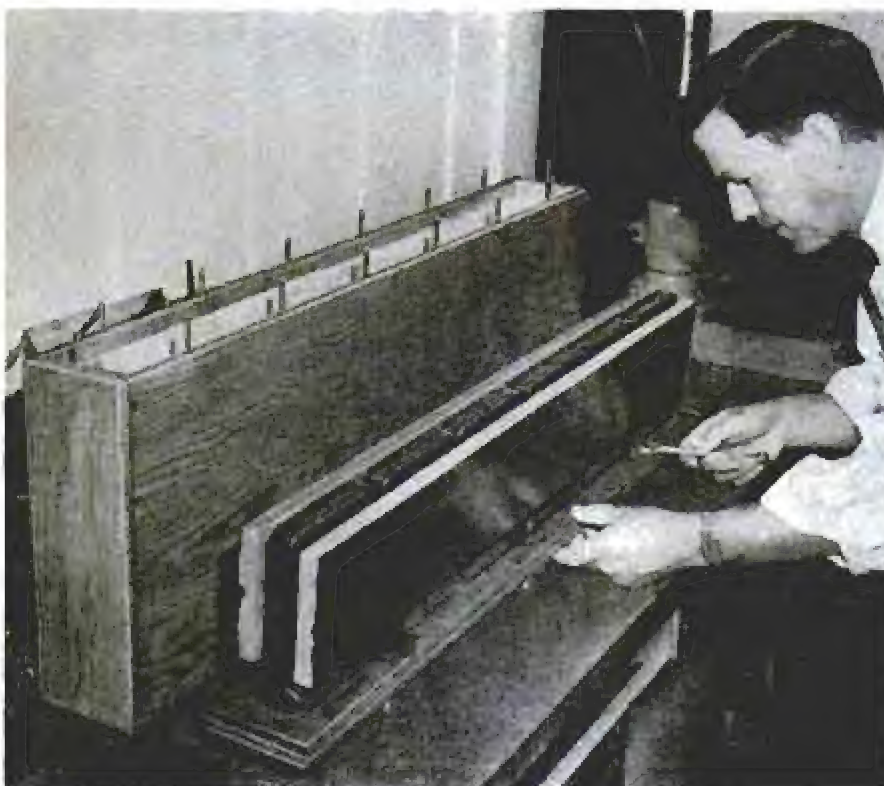
The offshore oceanographic stations that

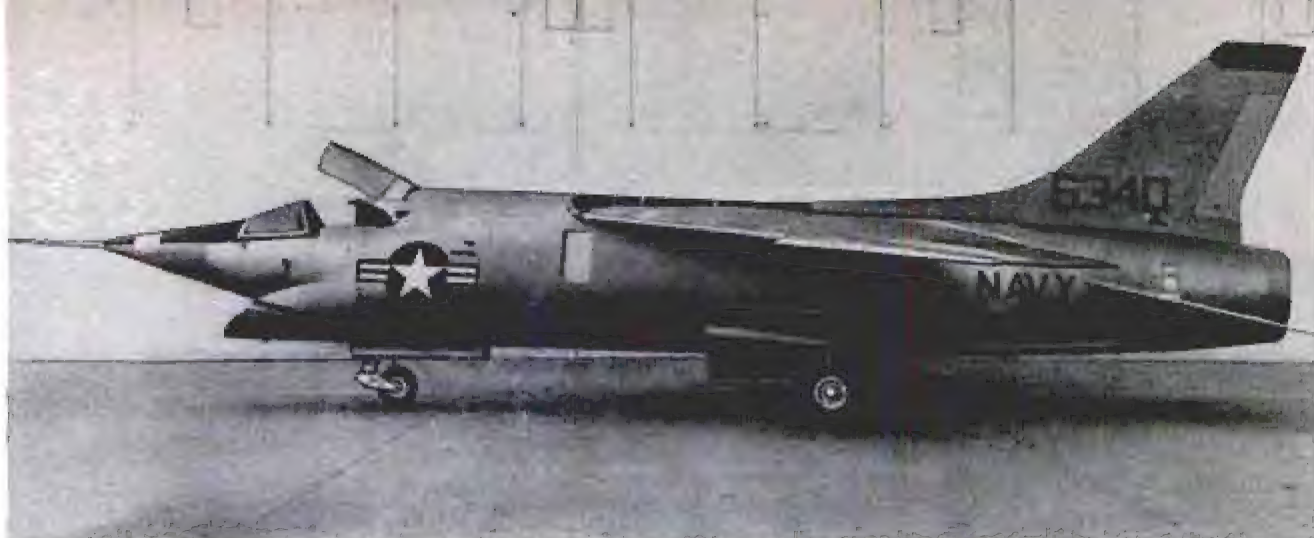
Scripps is maintaining on the Pacific consist of 14-foot decked skiffs with instruments that constantly measure wind direction and velocity, air temperature, and the sea temperature at five different depths. All this information is continuously recorded on rebuilt traffic-counting devices.

The skiffs are moored in water as deep as 12,000 feet by a new deep-mooring technique that allows them to float freely on the surface in spite of currents that otherwise tend to drag deeply anchored objects below the surface. In the new method, a buoyant spherical tank is moored below the strong surface currents, being attached to a weight on the ocean floor by a single strong

(Continued to page 256)

Assembling one of the large cells that will deliver steady current for three months. Elements will be placed in the waterproof wooden case





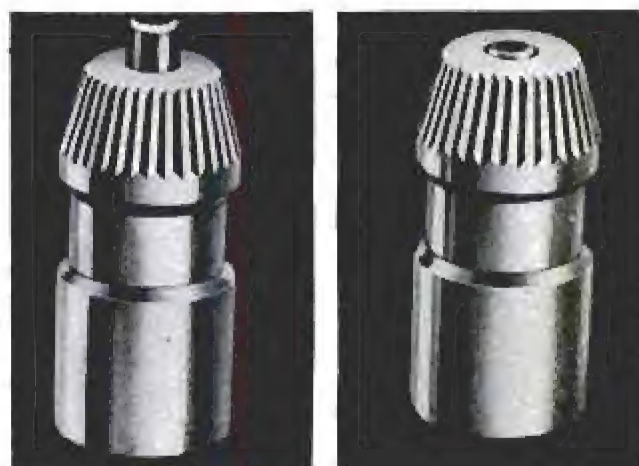
Navy Fighter Goes Into Combat at More Than 1500 M.P.H.

Chance Vought's Crusader III, a Mach 2, Navy push-button fighter, is capable of combat at more than twice the speed of

sound. It can also perform space-edge duty above 95 percent of the earth's atmosphere. It is armed with guided missiles.

Tire Valve Indicator Tells If Pressure Is Low

Tiny indicators attached to the tire valves on your car can tell you at a glance whether the tires are properly inflated. The indicator has a small red button that pops out $\frac{3}{16}$ inch to indicate that the amount of tire pressure is okay. When the button disappears into the indicator, this means a loss of six or more pounds of pressure. The device is preset to specified pressures of 40 to 105 pounds for truck tires with five-pound increments, and 22 to 34 pounds for automobiles with two-pound increments.



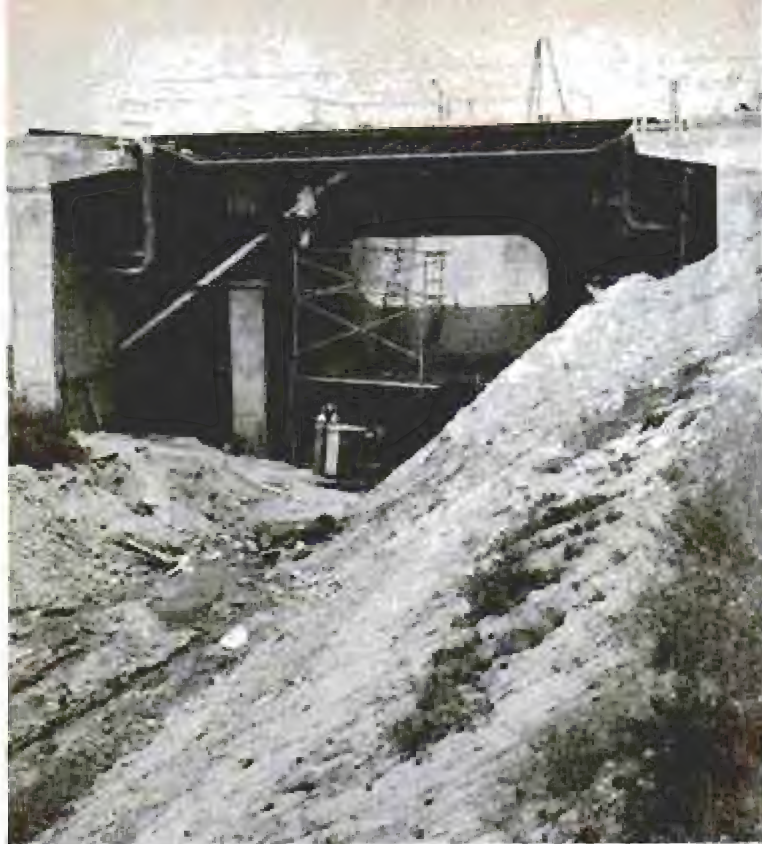
Telegraph Transmitter Operates Automatically

Western Union now uses a robot facsimile telegraph transmitter that feeds messages to itself mechanically and transmits them automatically in picture form. At the destination, a facsimile recorder receives and cuts off the message automatically, then readies itself for the next message. The device is called a flat-bed facsimile machine because messages are placed on a flat surface for transmission instead of being wrapped around a drum. Rollers draw messages through the machine automatically. The machine can handle messages of any length and up to $8\frac{1}{2}$ inches in width.



Chemical Sets Crease in Wool

Treating wool garments with a chemical solution developed in Australia reportedly will make the clothing's creases hold even in a rainstorm. The solution, which costs about 13 cents a garment, is applied to the fabric before the creases are set permanently with steam. The process was demonstrated recently in New Zealand.



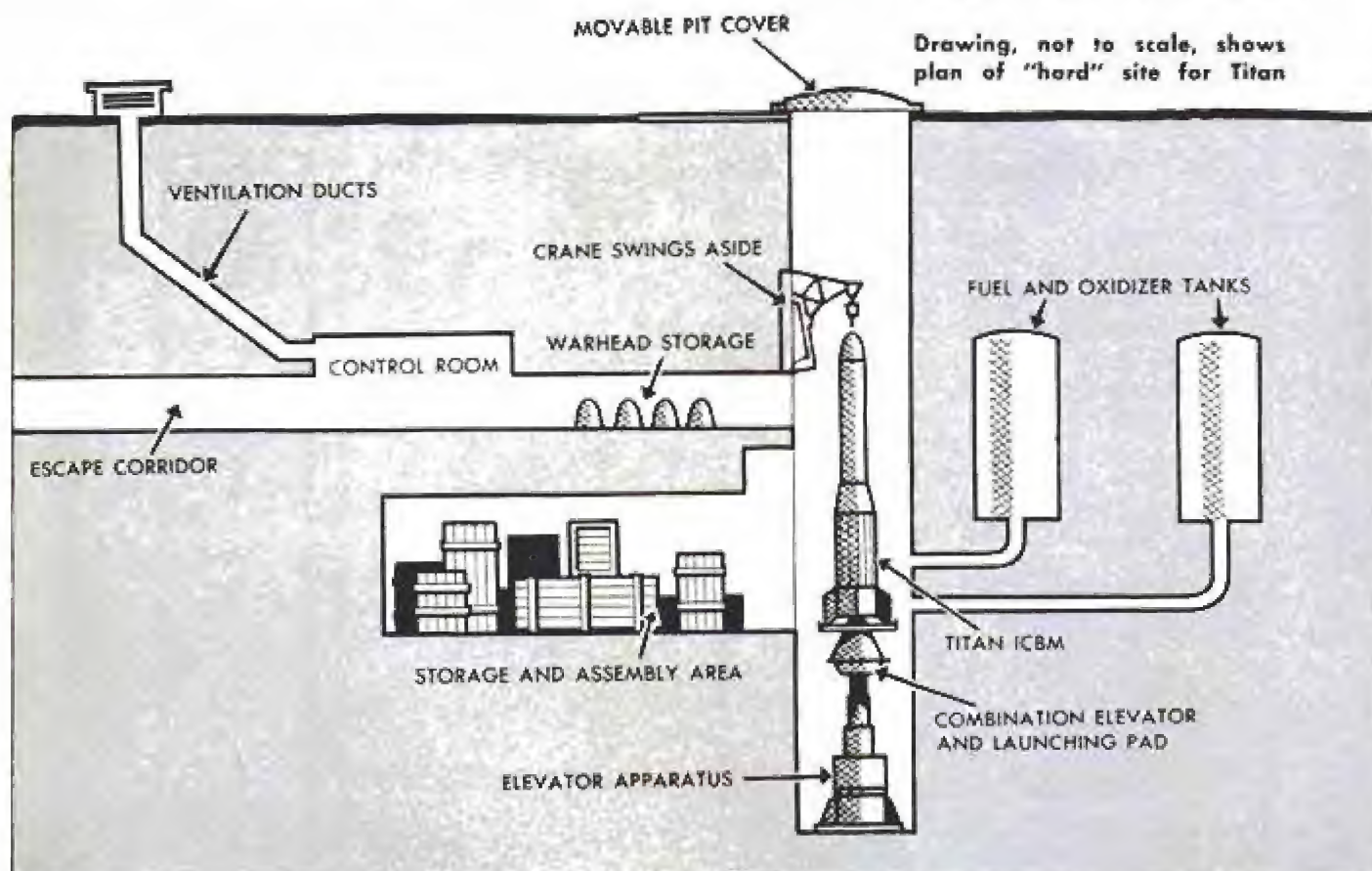
Launching pad for Atlas ICBM is flush with terrain. Opening below pad is flame deflector; cooling water flows into ditch

SOMETIME NEXT YEAR near Point Sal on the California coast an armored coverplate will move to one side, and a huge Titan intercontinental ballistic missile will slowly rise from its 150-foot concrete shaft. At ground level the enormous rocket will balance on the pad of its launching elevator for a few seconds, then with a tremendous blast of flame and sound it will climb upward, heading for the west Pacific beyond Wake Island.

There will be no witnesses nearby. Observers and technicians in a control room 75 feet below the surface will watch the flight by radar, television and possibly infrared.

The underground fueling, servicing and launching facility for Titan is being rushed to completion now at Vandenberg Air Force Base. It is an example of a "hardened" site, designed to resist anything except a direct nuclear blow. A near miss would leave the site unscathed. When completed there will be room for storing and assembling rockets underground, buried tanks to hold large quantities of fuel and oxidizer,

Underground Missile Base



possibly underground living quarters for missile crews.

Later on, "hard" sites for the Minuteman rocket will be built at Vandenberg. This missile, still in the design stage, uses a solid fuel and requires no lengthy preparation time. "Countdown with a Minuteman," says one missile expert, "consists of one word, Go!"

Each Minuteman will be literally buried in the earth, at the bottom of a deep shaft, and launched from the bottom of the shaft. There will be no elevating mechanism to lift it to the surface, no buried fuel tanks. Compared to present liquid-fueled rockets, the solid-propellant rockets will be relatively simple and possibly far more reliable.

The new rocket base is the training area for Strategic Air Command's 1st Missile Division. More than that, it is the site from which giant missiles, satellites

(Continued to page 258)

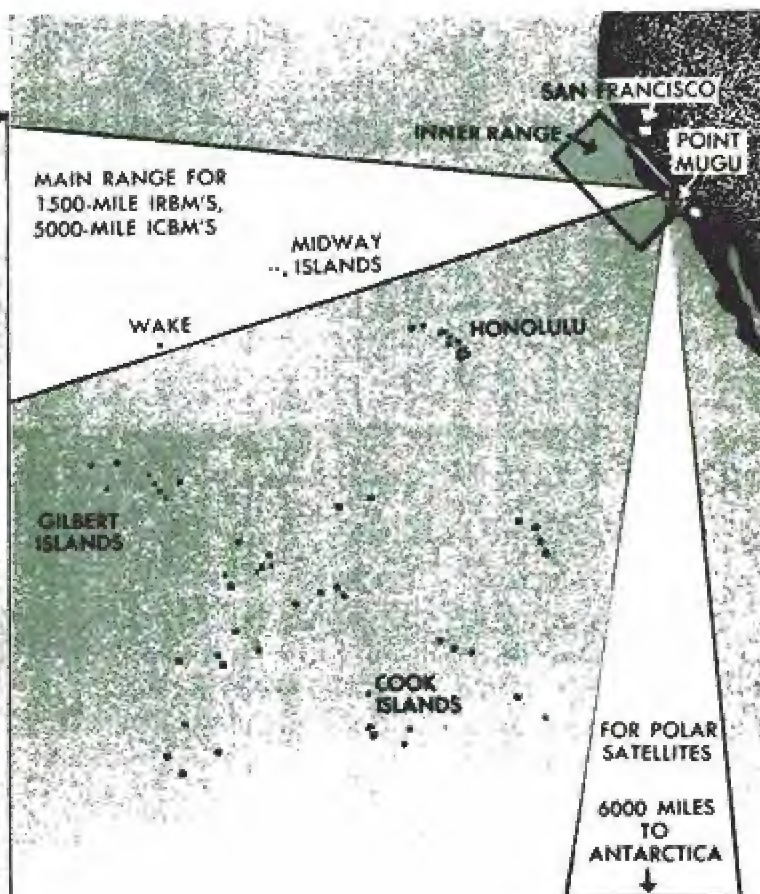
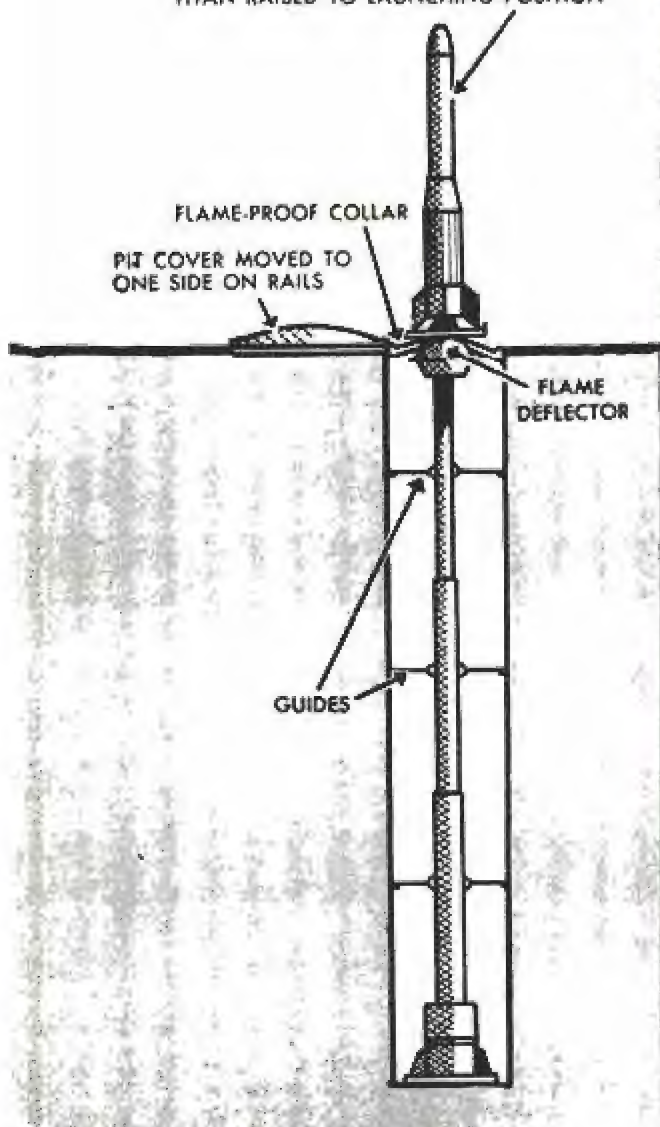


Air Force technician works manual pump to open escape hatch. An Atlas blockhouse, below, is partially beneath ground level



Map shows new Pacific Missile Range for space vehicles "too big" to be fired safely from Cape Canaveral. Fan-shaped area extending to south is path for satellites orbiting over poles

TITAN RAISED TO LAUNCHING POSITION





Dummies Are "Fall Guys" For Pilot Bailout Tests

Mannequins with rubber skins and built to conform to the shape, size and weight of human airplane pilots are being used by North American Aviation, Inc., to study high-speed bailout problems. Electronic equipment in the chest and stomach cavities records a wide variety of information that will help get pilots back to earth safely in case of an aircraft failure.



Rubberlike Metal Crystal Is Rigid Digit When Heated

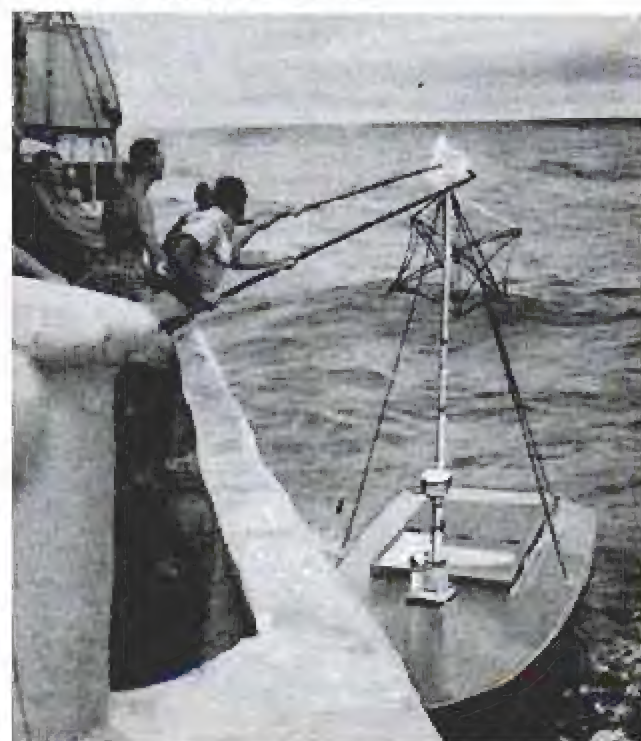
Scientists at the University of Illinois are investigating the properties of an alloy that bends like rubber at normal temperatures but becomes straight and rigid when heat is applied, as from a match or cigarette lighter. The alloy is composed of gold and cadmium. A single crystal of the metal forms a bar that will lift 10 times its own weight under the influence of heat.

Unmanned Boats Moored in Pacific Gather Data on Tuna

Sixteen-foot, unmanned boats have been moored in the Pacific for tuna-fish research. Anchored to old railroad wheels in water 2000 to 3500 feet deep, the boats carry instruments that gather information on currents, winds, tides, temperatures and ocean food life. They carry a radar reflector aboard to protect them against collision and help "mother" ships to locate them for data collection and repairs.

Antibiotic Sweaters To Have Treated Fibers

Antibiotic sweaters and skirts may result from an invention enabling mills to weave neomycin into both natural and synthetic fibers. The antibiotic textiles can be washed and ironed without loss of the antibiotic. Neomycin applied to the textile fibers with the new process adheres uniformly to the fibers and is capable of a continuing antibacterial action.





Ball-Point Pen Has Built-in Light

Campers, travelers and photographers who sometimes need to make memos or notations in darkness or under poor lighting conditions may get an assist from a ball-point pen with a built-in light. The plastic cover of the device can be removed, converting it into a pocket flashlight. Ball-point pen refills are available and the lighting unit takes standard-type batteries.

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Aluminum Siding Has Plastic-Foam Backing

Aluminum lap-siding backed by expanded plastic foam is available for house building, repair and remodeling. One man can install the siding on a house in about the same time it would take him to apply paint. In addition to light weight, the siding has superior insulating and moisture-dissipating properties. The backing is $\frac{3}{8}$ inch thick. It will not shrink, rot or warp, and it resists termites and other vermin that may attack wood siding.

Experimental Photo Flashbulbs Carry "Battery" in Metal Base

Self-powered photographic flashbulbs are being developed at the Battelle Memorial Institute. The bases of the flashbulbs contain primary cells made of alternating layers of magnesium foil, paper and silver-plated copper. When the sandwich-like cells are moistened with a few drops of water, enough power is produced to flash a bulb for a period of 20 minutes. The bulbs are still in the experimental stage and not available commercially.

Farmer Builds Own Rotary Cutter and Hay Dryer From Scrap Auto Parts

Scrap automotive parts are converted into efficient farm implements by Louis Baker of Beallsville, Pa. Baker has built a rotary hay cutter and a steam-heated hay dryer with scrap materials. Heart of the rotary cutter is an old truck differential mounted vertically on a framework. To the differential is welded a regular automotive universal joint which serves as a hitch to the tractor's power take-off. The heating unit of the hay dryer consists of an old residential, coal-fired, steam-heating boiler, complete with attached stoker. Steam from the boiler is piped through a panel of 10 old auto radiators which have been brazed into a unit. An industrial fan

draws air through the radiator panel and exhausts it into a vented tunnel through the hay.



Reprinted in 1974 by Popular Mechanics

ALASKA

“BIG LAND”



Since the Klondike strike of the 1890s, more than \$700,000,000 worth of gold has been found in Alaska

THE LATE GENERAL Billy Mitchell, who gained a niche in history by correctly forecasting the significance of air power, also made this prediction: “Whoever holds Alaska will hold the world.”

Mitchell's canny insight showed him the future strategic importance of polar air routes. But the prediction had no more impact than a damp sponge on a window when he made it in 1935. Alaska then was believed by many people to be the legendary land of “Dangerous Dan McGrew” where sourdoughs scooped gold dust out of mountain streams and raced dog sleds across endless glaciers.

At that time the total population of the territory, around 60,000 including Indians and Eskimos, would have made a city smaller than Terre Haute, Ind.

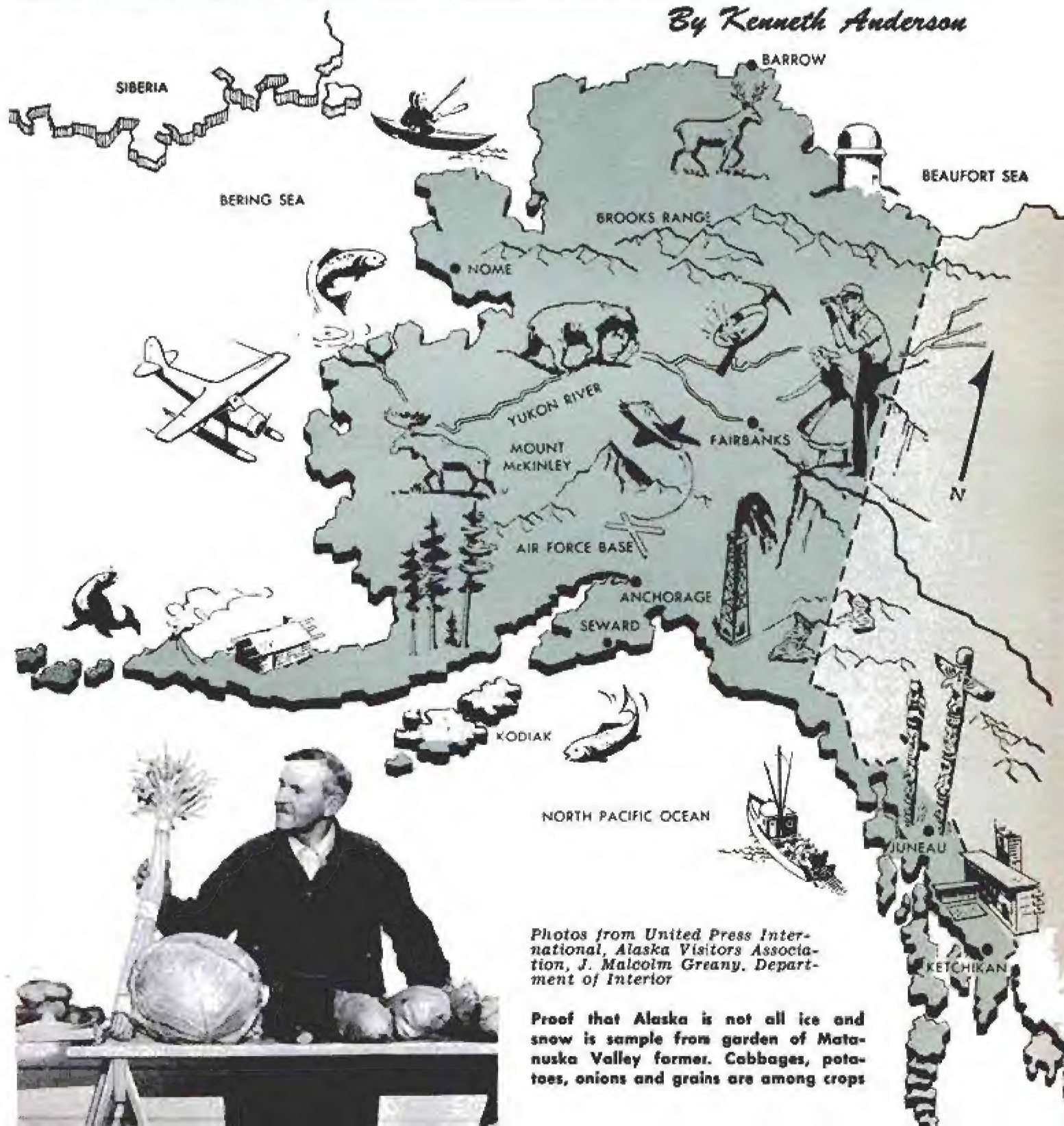
Matanuska Valley has fertile farm lands which produce fabulous vegetable crops during long summer days



Our 49th state has almost everything from traffic jams to untamed wilderness. You can hunt bear in the morning, attend a symphony concert in the evening and play a round of golf at midnight. It's 20th century technology and Wild West frontier in a large economy package

OF CONTRASTS

By Kenneth Anderson





Superimposed on map of United States, Alaska would stretch from border to border and coast to coast. Fur, fishing and mining are top industries in this state where totem poles and dog teams are as common as TV

A generation later, as Alaska cuts its statehood teeth, a *cheechako*, or tenderfoot, would find this vast, last frontier has indeed become the keystone of global strategy that Billy Mitchell envisioned. Big Air Force bases have been established—Eielson and Ladd at Fairbanks and Elmendorf at Anchorage. Army units are stationed at Fort Richardson, Big Delta and at Port Whittier (where a single building recently was completed at a dollar cost approaching the original purchase price of Alaska). Navy installations are located at Kodiak Island, Adak and Fairbanks. Numerous radar units are scattered over the rugged terrain of this polar crossroads.

Every fourth person among the 213,000 residents of our 49th state is a military man or one of his dependents. Like the permanent citizens, they are fully aware of Alaska's vital security role. The former owners of this land, the Russians, have air and missile-launching bases just beyond the Bering Strait. At the Diomed Islands, the United States and the U.S.S.R. are separated by only 2.4 miles of water.

The United States acquired Alaska from Russia in 1867 for \$7,200,000 in gold. Although the price of the area—as big as Texas, California and Montana combined—amounted to only two cents an acre, the

deal was bitterly opposed by many Congressional leaders. They thought the land was worthless.

According to history books, the Czar also considered Alaska a liability and had tried for nearly 12 years to peddle it. After the Crimean War started, the Czar feared that Great Britain might seize Alaska before it could be sold.

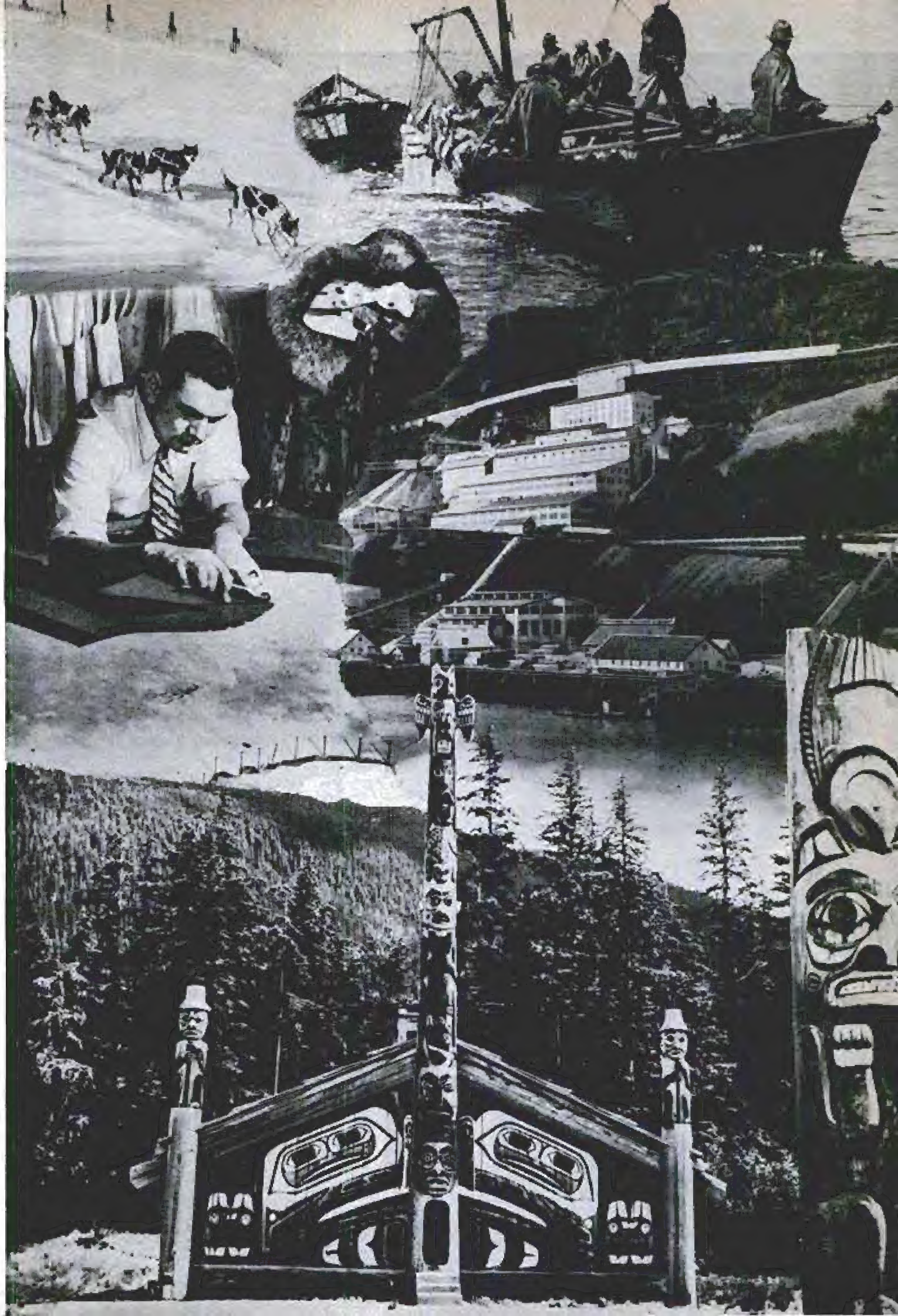
Americans, still licking the wounds of the Civil War, also objected to Russian demands that the payment be made in gold. Neither nation was aware that Alaska was loaded with mineral wealth. Since the Klondike strike of the 1890s, nearly \$700,000,000 in gold has been taken out of Alaska. The streams and mines now yield \$8,000,000 worth of gold each year. And there's still a bank in Nome that will cash a poke of gold dust!

Besides gold, Alaska has deposits of most of the 33 strategic and commercially valuable minerals, such as tin, mercury, chromium, copper, zinc, platinum, tungsten and antimony. Uranium production began in 1957 and a dozen oil companies have leased millions of acres for exploration. The first oil well is producing 900 barrels a day. A huge iron deposit has been found at Klukwan. And Alaska coal mines yield about

(Continued to page 228)

Eighty percent of all fur seals in the world live on the Pribilof Islands, off the west coast of Alaska







German "Ski Pony" Gives Fast Ride

Winter sports fans in West Germany now go skijoring over level stretches of snow at speeds up to 40 miles per hour behind a machine called a "ski pony." The propeller-driven machine is mounted on a single ski and is equipped with long handlebars. The skiers grasp the handlebars and the ski pony tows them over the snow. The engine can be controlled by a switch on the handlebars. The machine also can be used as a ski lift on grades of up to 10 degrees.

Wind-Resistant Tarpaulin Fastens to Track on Side of Truck



Truck tarpaulins stay securely in place when their ropes are connected by snap fasteners to tracks on either side of the truck box. The tracks are pipes with slots along the top. At the truck's rear, the ropes are hooked to a cable attached to a coil spring under the box. Tension on the cable keeps ropes tight on both sides. Unhooked, the tarpaulin can be slid forward quickly.



4000 Letters Handled in Hour

Letters can be folded and stuffed into envelopes at a rate of 4000 per hour by a small electrically driven machine. The folder-inserter does the work eight times faster than it can be done by hand. Two enclosures can be inserted in each envelope simply by putting the material through the machine twice, or several pieces can be inserted in one operation by nesting them together in advance. The folding unit of the machine will handle eight different folds.



Power Unit on Wheels Substitutes for Permanent Substation

Montana's Hill County has a mobile electric substation for use while permanent substations are shut down for maintenance. The rolling substation can "step down"

33,500 or 67,000 volts to 24,940, 14,400, 12,470 or 7200 volts. It has a forced-oil-cooled transformer, disconnect switches, lightning arresters and reclosers.

Awning-Type Storm Sash Opens With Window

Both the storm sash and primary awning-type window can be opened and closed from inside the house when the storm unit is attached to the sash. This new type of storm window can be added to most houses without special alterations. The sash is made of aircraft aluminum and is surrounded by vinyl weatherstripping. When the primary window is opened or closed with the inside controls, the storm sash moves with it.



"Sunglasses" for Camera Eliminate Reflections

Attached to the front of a reflector on flash guns or electronic flash lamps, a polarizing unit acts as "sunglasses" for a camera. The unit polarizes the light to eliminate glare, reflections and hot spots from photographs. Used with color film, the polarizing unit heightens the vividness of colors without distorting their values. The unit can be attached to any reflector that is 5¼ inches in diameter or smaller. Two clip-on metal rods hold the unit in position for use.

Ⓒ Inflated with nitrogen instead of air, airplane tires have been exposed to nuclear radiation without detrimental effect.



PERCENTAGES

Chart of accidents caused by mechanical failure shows faulty brakes as chief cause

35.3

BRAKES

10.5

TIRES

9.6

ENGINES

7.6

COUPLINGS

5.6

WHEELS

5.5

STEERING

4.4

LIGHTS

4.2

SPRINGS

3.2

FUEL

2.4

AXLES

11.7

OTHER

(including drive shafts,
U-joints, wipers, etc.)

100.0 **TOTAL**

Alert ICC inspector slaps out-of-service sticker on the windshield of a truck having unsafe brakes. This brings quick repairs by the truck owners



ROAD



THE HIGHWAY INSPECTORS..

By Thomas E. Stimson, Jr.

CHARLES SANDS, truck safety inspector for the Interstate Commerce Commission, walked over to the heavily loaded truck and trailer that had stopped at the road block. He climbed up, opened the driver's door, and grabbed the wheel to balance himself.

"Your front right tire is too thin for safety," he told the driver. "There are no brakes on your front wheels, and your steering is dangerously loose. I'm putting an out-of-service tag on this rig until it's made safe to drive."

The trucker was amazed. "I've been planning to change that tire," he admitted,

BLOCK AHEAD!



..Are **MAKING TRUCKS SAFER**

Truck inspection proceeded far into the night at Dunsmuir, Calif., in vast safety check conducted by state

"but who told you about the steering? And how do you know about the brakes?"

Sands told him. He had simply looked at the truck while it was slowing down. He could see there were no brakes in front. And when he took hold of the steering wheel he gave it a partial turn. The movement was rough and play was too great.

Sands works for the motor-carrier-safety section of the ICC. His job is to check the mechanical safety of the commercial vehicles that carry merchandise across state borders or that transport the same merchandise inside a state.

Before he finished with the truck, Sands

found other safety violations that he entered on his compliance check sheet. The truck took twice the legal distance to come to a stop. Half a dozen lug nuts were missing from its wheels. A brake hose was so frayed it was ready to burst. The driver's medical certificate was out of date. And the driver's log, showing time off and time at the wheel, had no entries for the last two days.

This truck was in bad shape but it wasn't too exceptional. Of 12,018 trucks inspected by the ICC in a recent nationwide check, 2427 were judged "so imminently hazardous to operate as to be likely to



Highway patrol officers check weight of load on each axle of huge log carrier during "round up" at Dunsmuir

Inspector Charles Sands of ICC checks air lines between tractor and semitrailer for signs of wear on the rubber. Lines must be suspended to avoid rubbing



Brake tester clamped to running board of truck shows speed at which brakes were applied and stopping distance. Brakes on this truck were in excellent shape





Inspectors use special apparatus to check transmission time for the air to reach farthest brakes on big truck

cause an accident" and were put out of service until repairs had been made. The ratio was one dangerous truck in every five.

The ICC is cracking down on unsafe trucks because commercial carriers are an important part of highway traffic and when a truck is in an accident the wreck is often a disastrous one. (Mechanical faults in private cars may be just as numerous but the ICC has no control over these.)

Especially, these days, the ICC is concerned with brakes. There have been too many headlines like "Brakes Snap on Mountain, Truck Kills 5" and "Brakes Gone, Truck Derails Train, 5 Killed." In the ICC checkup above, more than half the trucks that were inspected had faulty braking systems.

When Sands inspects a truck he merely walks around it, climbs up in the cab, and crawls underneath a couple of times. He needs no more than 10 minutes. Yet in that time his trained eyes and ears have checked more than 50 items, ranging from windshield wipers and horn to the rear clearance lights and the rear crash bar that prevents a low automobile from ramming underneath the truck during a rear-end collision.

Special-purpose vehicles such as acid tankers, household vans, gasoline tankers and pressure vessels for hauling butane are all protected by extra regulations and require special inspection.

A gasoline tanker, for instance, must have "overturn protection" on top. It must have a weak shear section in its discharge pipe that will break on impact. The tank must be equipped with an inner valve that is opened only when cargo is being discharged. In addition, there must be a fore-and-aft cable the whole length of the tank so that the driver can yank either end to close the discharge valve in case of fire. A fusible link that melts in the heat of a fire and automatically closes the valve is another requirement.

Nimble ICC inspector must climb in and out, over and under for checkup. It takes 10 minutes





Giants of the highway lined up awaiting safety inspection—many drivers welcome this for own protection

All vehicles receive a thorough inspection of their braking systems. The ICC rule is that a truck must be able to stop in 30 feet from 20 miles per hour, regardless of load. The average passenger car can stop in 20 feet or less from the same speed. As originally built, most truck-braking systems conform to the rule. But the brakes of a big 30-ton rig are complicated and need diligent maintenance. Too, some trucking companies tend to overload their brakes by carrying excessively heavy loads.

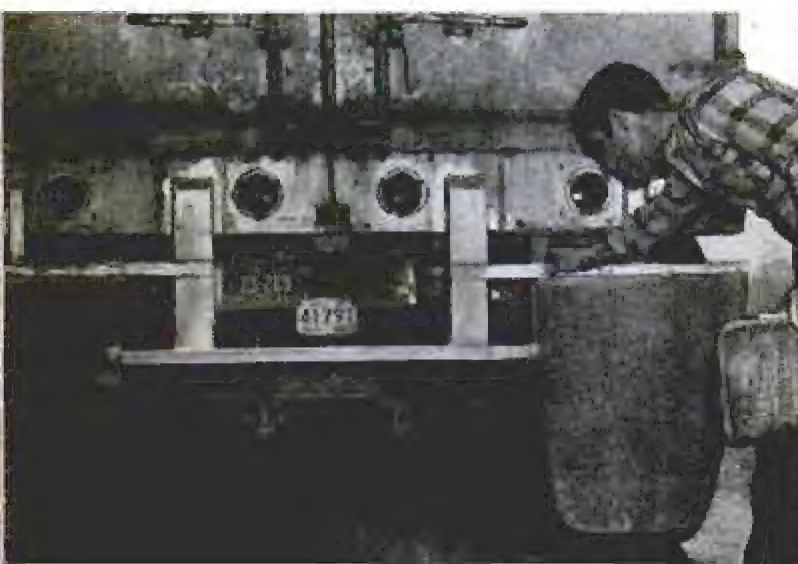
Crawling under a truck, Sands inspects every brake drum and shoe. He checks all air lines for abrasion and wear. Up in the cab with a stop watch, he measures the air

leakage in the booster system while the driver keeps the brake applied. Next, he has the driver run down the air pressure to make sure that the low-pressure warning device is operating. This may be a buzzer or a bright light or a small flag that drops down in front of the driver's eyes.

He inspects the check valve between the compressor and storage tank, that prevents backflow if the line breaks. If there is a trailer, he looks for the tractor-protection valve. If the air line to the trailer breaks, this protection valve plugs the line so that air is still available to the tractor brakes. Next Sands crawls under the trailer itself

(Continued to page 260)

Crash bar below the bed of this truck satisfies a safety rule to prevent low car ramming underneath



Beneath truck, inspector Sands looks at condition of brake-cylinder hose attached to vacuum brakes



Italy's Pots-and-Pans Band



Music from this coffee grinder is a popular concert feature

HAVE YOU ever heard the plaintive strains of "O Sole Mio" as written for coffee grinder and frying pan? It begins with a soft pizzicato from the cheese graters as the conductor of the La Racchia orchestra lowers the big spoon in his right hand. The spoon is the baton for maestro Emilio Casagrande who directs the straw-hatted musicians as they produce melodies from kitchen utensils and other household items. The concerts of La Racchia, which translates roughly as "the ugly one," have been very popular in Italy, where the band was organized several years ago. The pots-and-pans band became famous after a television appearance. A stovepipe with spoons for keys has a tone vaguely reminiscent of a saxophone. A grill is strummed like a guitar. And flasks are wielded like maracas. Coffee grinders and knives produce a special effect while a trill is coaxed from a frying pan. The band hopes to make a tour of the United States.

For a real cool performance, there's nothing like a hot solo improvised on a barrel

Robust rhythm is produced by the grill-guitar and a saxophone from a stovepipe



Now, a-one and a-two, and keep an eye on maestro's "baton"





Self-Propelled Baler Gives Operator Top View of Work

Roaming the hayfields now is a self-propelled baler, the first of its kind. From his seat the operator can see every phase of the baling operation. One lever on the control panel controls ground speed, another

baling speed. Powered by a 51-horsepower engine, the New Holland baler has an output of up to 400 bales per hour. There are four forward speeds, and ground speed is independent of baling speed.



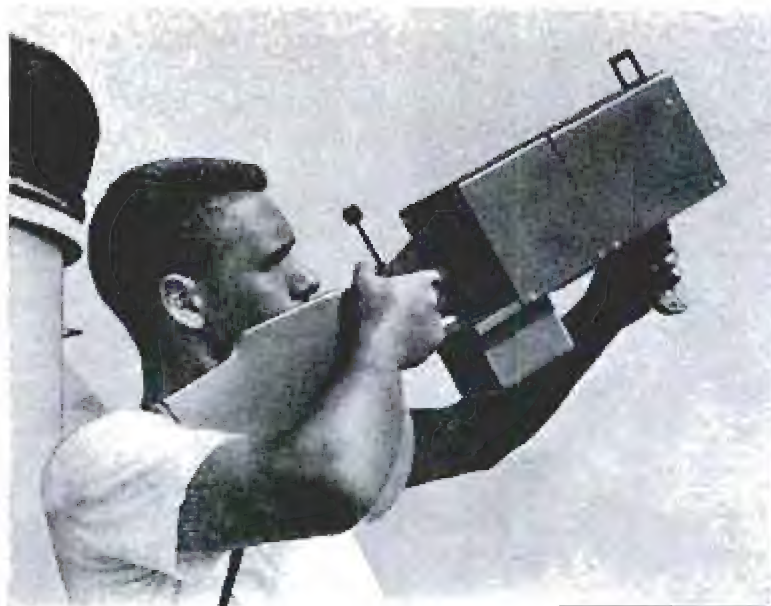
Plane Passengers' Ramp Mounted on Small Truck

Airline passengers can deplane onto a ramp mounted on a pickup truck. The mobile ramp is operated by a hydraulic lift and can be raised or lowered to match the level of the plane's door. This adjustment is controlled from the truck's cab by the driver. Also driver-controlled are hydraulic stabilizers that are lowered to the ground beneath the front and rear of the truck. A rubber buffer at the front of the ramp prevents marring of the plane while the unit is being used.



Earth's Magnetic Field "Erased" for Ore Studies

Prospectors who locate ore deposits by aerial surveys will be aided by a new instrument that analyzes the magnetic properties of minerals. The device, an astatic magnetometer, has six electric coils around a suspension mechanism in a plastic tube. When current passes through the coils, the earth's magnetic field is reduced to zero within the instrument. The magnetic flow and intensity in the specimen twist the mechanism in the tube, and the effects are measured. The direction of magnetic flow tells the age of the ore, which assumed the direction of the earth's magnetism at the time the ore was formed.



Special radiometer, aimed like a gun, was used to measure radiation during re-entry

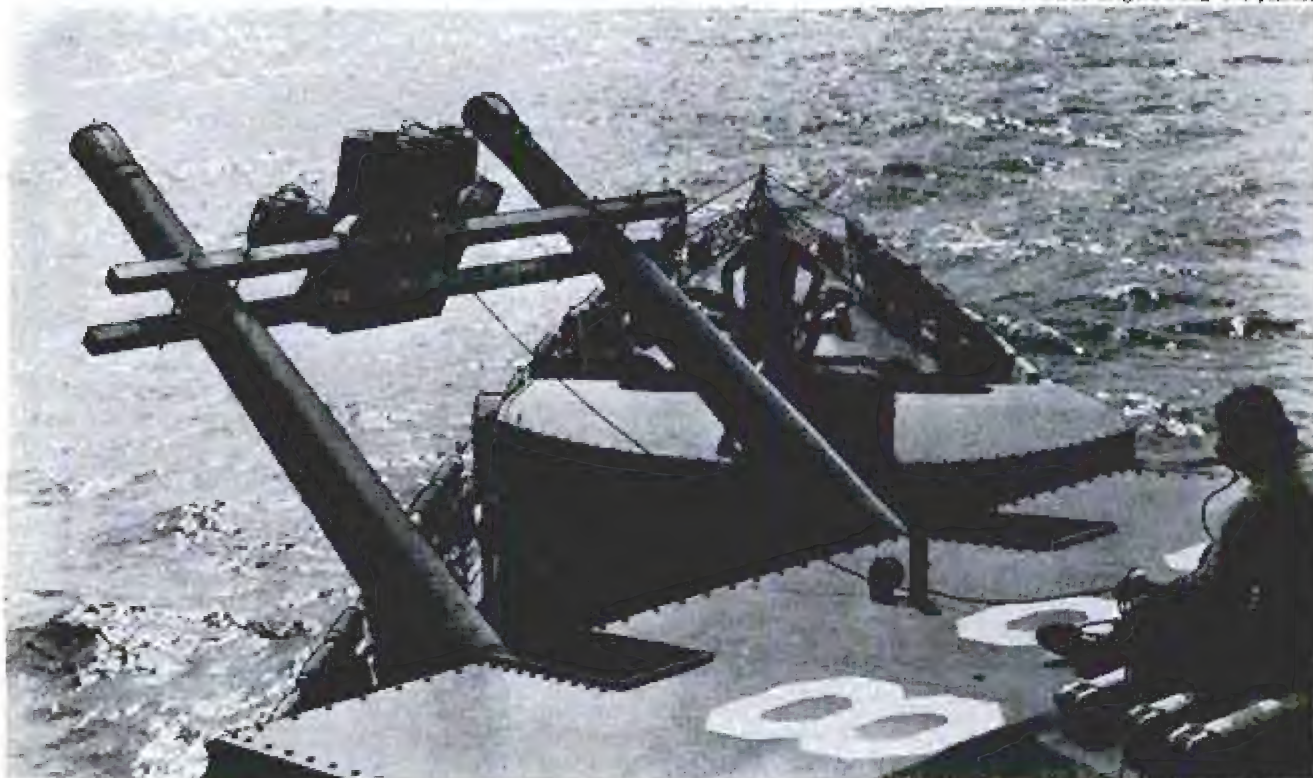
FOR THE FIRST TIME, photographs have been taken of the spectacular re-entry of a Jupiter missile. The missile was fired from Cape Canaveral, Fla. Fifteen minutes later and 1500 miles away, scientists aboard a Navy ship photographed the missile as it re-entered the atmosphere at 9000 miles per hour. Three parts of the missile—the nose cone, the rocket body and the instrument package—glowed so brilliantly that the ship, about 50 miles away, was perceptibly illuminated.



Unusual photo shows three glowing parts of the Jupiter missile

Missile Poses for Photo As It Re-Enters Atmosphere

Six cameras were mounted as a unit on the destroyer's guns for stabilization against roll and pitch
Barnes Engineering Co. photos





Penguins usually sag when they deplane into New York's heat

THE TRANSPORTING of animals is becoming an important part of the airlines' business.

As one example, Pan American World Airways carries 30,000 animals a year—not counting some seven million baby chicks, two million canaries and several million tropical fish.

The wild-animal cargo ranges from sloths and anteaters to baby elephants (up to 1100 pounds) and pygmy hippopotami. Domestic animals are also transported. A single plane might fly a herd of 16 Brahman cattle or 12 Texas quarterhorses.

An extensive amount of research and observation went into the build-up of the animal-carrying business. KLM Royal Dutch Airlines was a notable pioneer in the field. Developing its animal service under the direction of Dr. J. C. W. Hesse, veterinary surgeon associated with Utrecht University in Holland, KLM scheduled numerous trips for its animal-transport planes so that Dr. Hesse and his staff could observe flight reactions of the various species and make tests, such as measur-

LOOK WHO'S



"Shorty," said to be world's smallest horse, is "tried" after air trip from Scotland

ing the oxygen and moisture content of the air. Besides having a hand in the design of special airborne cages, Dr. Hesse concluded his research by supervising the preparation of KLM's "Manual for the Carriage of Live Animals." The book is crammed with more than 100 pages of directives and it's the guidebook of KLM's animal attendants at all major stops.

Just what did Dr. Hesse and his staff learn about animals in the air? For one thing, most animals seem to prefer air travel to ocean voyages. Birds can tolerate a limit of 36 hours aloft, and require light. They won't eat if lodged in a dark cargo area. Snakes, on the other hand, like it dark. They snooze peacefully throughout the entire flight and require neither food nor water.

Baby elephants are tractable but gregarious chaps that prefer to travel in pairs. Otherwise they



Photo courtesy Seaboard and Western Airlines

A shipment of monkeys arrives from Siam. Monkeys prefer that tigers do not ride on same plane with them

COMING IN BY PLANE!

By John Franchey

Pan American Airways photo

get lonely and are likely to become nervous in flight. After considerable experimenting with other animals, it was discovered that the ideal traveling companion for a single young pachyderm is a small white chicken—white in deference to the elephant's notoriously poor eyesight. After a day or two of preflight acquaintance, Dumbo becomes quite attached to the chicken and lets it perch on his head. At the first trace of skittishness during flight, the attendant ties the chicken to one of the elephant's legs. The effect is miraculous. So fearful is Dumbo of crushing his tiny pal to death that he quickly calms himself.

Most disliked and feared by his fellow passengers is the tiger. A mere whiff of him is enough to send the monkeys into conniptions

This chimp, who hails from warm clime, doesn't care for New York's winter weather





Lion cubs awaiting veterinary inspection at New York airport find no shortage of feminine attention

and set the parrots and macaws squawking. This problem is disposed of by assigning the tiger to the tail section of the plane, where fans keep his scent downwind and impossible to detect.

The thoroughbred race horse is probably the most fractious of all air travelers. He starts balking near the entrance of the plane and has to be enticed aboard either by a lead pony or patient persuasion. Once airborne, however, in a box stall that permits him to stand in perfect comfort but prevents him from kicking, he soon settles down.

Air transport of thoroughbreds has made trans-Atlantic racing possible. For several

This young hippo weighs just 50 pounds, but planes are equipped to move baby elephants weighing 1100



Sixteen Brahman cattle from Texas board plane in Miami for Havana. They weigh 500 pounds each

years, Pan American has carried the entire field of European entries to the International Race at Laurel. Horses can compete the day after an ocean crossing by air, although an extra day or two are usually provided. This means that an owner can run his horse in England or on the Continent one day, ship him to the United States aboard a Clipper the next day, race him there and have him back home again—all within a week or 10 days.

Do any of the airborne animals try to escape? Dr. Hesse reports that the anteater has freedom on his mind during the entire trip. He spends most of his time hurling himself against the sides of the crate in

Elephants' preference for companionship is respected. If there's just one, he rides with a chicken





Like a job as animal handler? Here's a KLM Royal Dutch Airlines handler getting to know a honey bear

which he's transported. His crate is built especially strong for just that reason.

Hardest of the animals is the day-old chick. He needs no attention at all and can go three days without food, existing on what he's stored in his gullet while breaking out of his shell.

Tropical fish are no bother either. They're carried in large plastic bags filled with water. Once oxygen is pumped into the bag and sealed, the fish are all set.

Other animals need a good deal of care. Seals and walruses, for instance, can't tolerate long dry spells, so between hops they are given a long soaking with a hose.

This stowaway monkey survived a trip at 20,000-foot altitude. He hid in luggage



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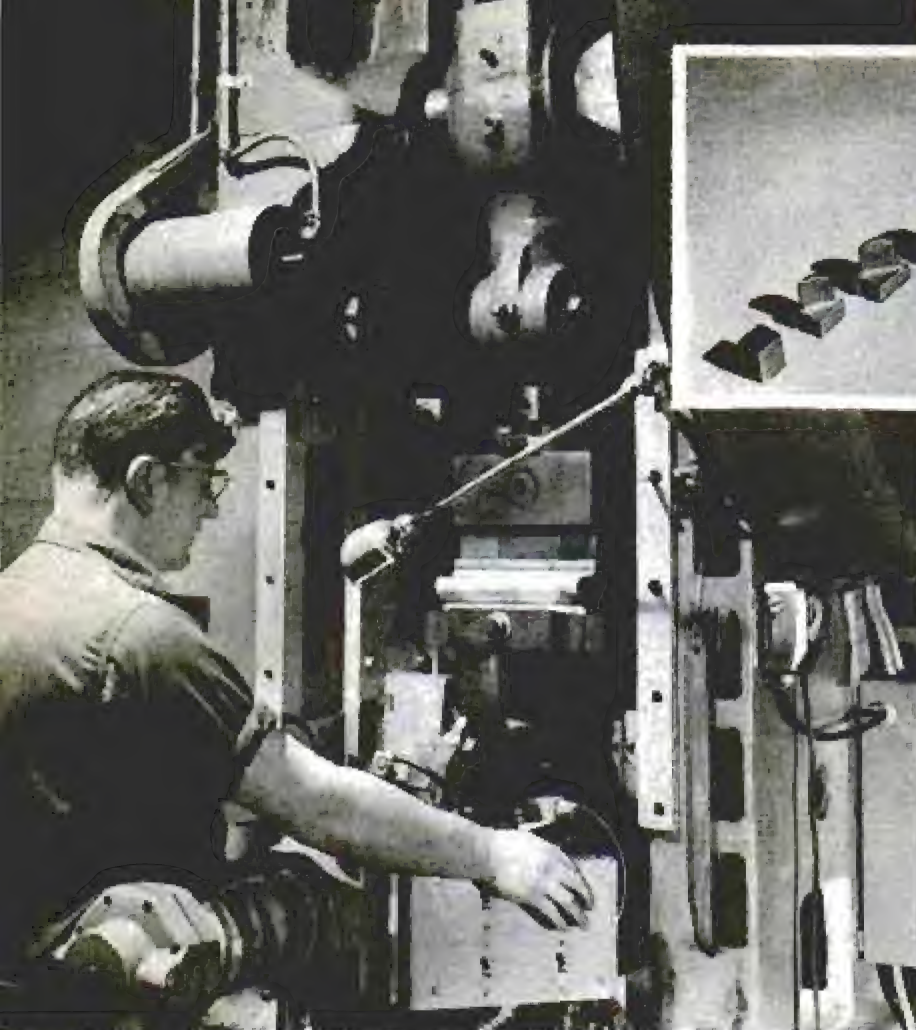
Flying from Chile to Florida, an immigrant ibis named Willie gets his "vittles" from a PAA cargo hostess

Dr. Hesse also found out that most dogs seem to be a settling influence, while cats are a disturbing element, particularly when there are race horses aboard. The presence of a cat on the plane may make the horse nervous and irritable. The only way to be sure is to introduce the two animals formally before take-off and observe the horse's reaction. If it's favorable, the cat is placed aboard.

Birds, strangely enough, don't mind having cats aboard. And, stranger still, cats never seem aware of the presence of their favorite prey, although there may be hundreds of them on the same plane. ★ ★ ★

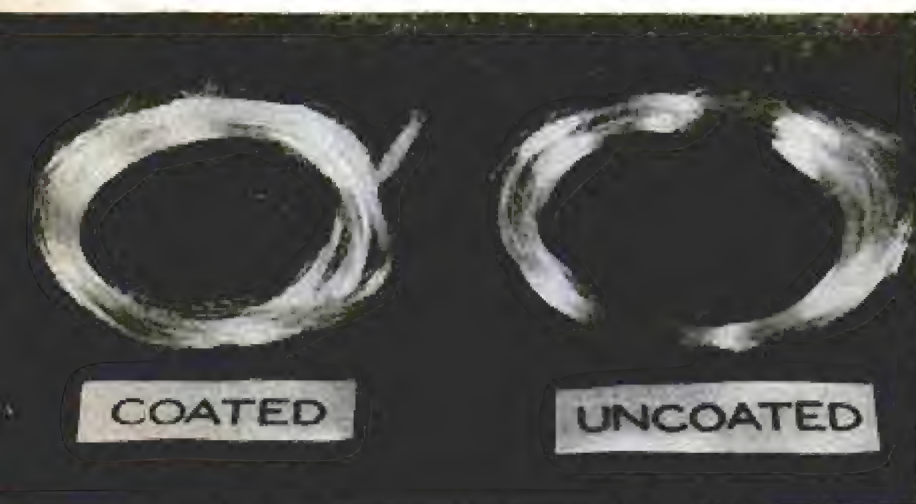
Seals and walruses can't stand long dry spells. That's why it's necessary to hose them down thoroughly before a flight





Tiny Engine Blades "Rolled and Coined"

Blades for aircraft engines are now produced by General Electric Co., by a process called "roll and coin." The process includes as many as 40 individual operations, including extrusion, rolling, coining and trimming. The blade starts as a rectangular slug. An attachment, fitted to a conventional press, holds a piece of metal in position under pressure. Roll dies then form the foil portion of the metal, after which the dies revolve and roll out the air-foil portion of the blade.



Sand Fibers May Be Used To Build Spaceships

Continuous fibers can now be drawn from silica, or sand. The hair-thin fibers are stronger than steel. Coated with metal, they may someday be used to form hulls of boats and shells of spaceships. In tensile strength, fiber samples test more than 600,000 pounds per square inch. It is estimated that the fibers can withstand temperatures of 1000 degrees centigrade. Most metals melt or weaken at this heat.



Wind-up Automobile Clock Set Into Horn Button

Motorists have a clock at their fingertips when their car is equipped with a timepiece inside the horn button. The clock, actually a 17-jewel watch, is not electric, being wound by a stem on one side of the button. Manufactured in Germany, the clock replaces the horn button on Volkswagens and DKW models built since August 1955. A button on the rim turns on a light behind the face of the clock.



Firefighters Use Combination Stretcher and Ladder

England's firemen are using a combination stretcher-ladder. The unit is 7 feet 8 inches long and 1 foot 7½ inches wide. Used as a stretcher, the unit includes a

canvas container and crossover straps. Several sections can be joined together quickly to form a long ladder. The unit is made of aluminum alloy with curved rungs.

Extra-High-Voltage System Scheduled to Transmit 750,000 Volts

General Electric plans to build a system that will transmit power at the highest voltages in history—750,000. A model tower (below left) has been built to 1/25 scale.

The full-size tower will be 160 feet high and 180 feet wide. Gigantic bushings such as the one below—for a 650,000-volt transformer—will be used in the new system.





Photo courtesy Model Railroaders

This diesel locomotive weighs 12 pounds and is able to pull more than 18 passenger cars



Only 7½ inches long, this model is made of Strathmore board, with metal trucks and poles

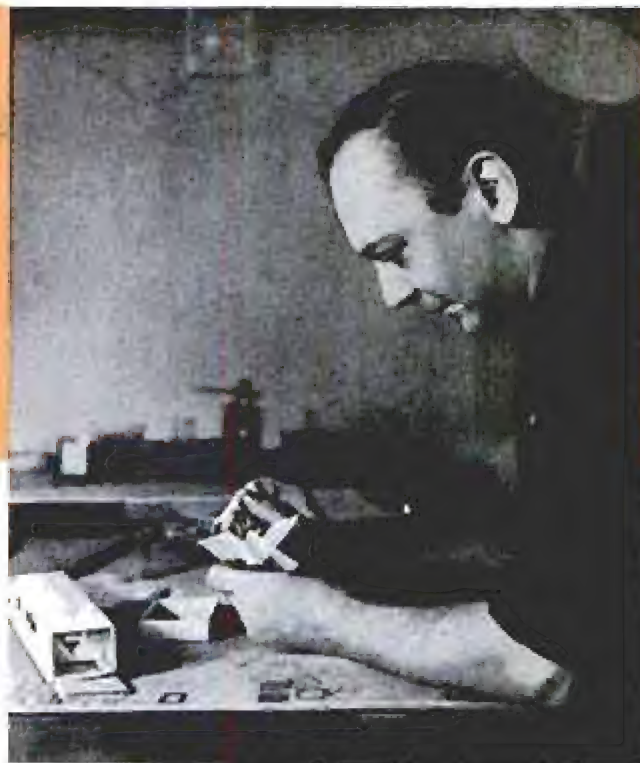
A ¼-inch scale model of a trolley used on Illinois Terminal System

Windows are drawn on Strathmore, cut out with blade and formed with wood rod and sandpaper



MODEL TRAINS OF PAPER

... and They Run



A model builder by trade, William Clouser of St. Louis puts his deft touch to an electric trolley

By Robert Hegge

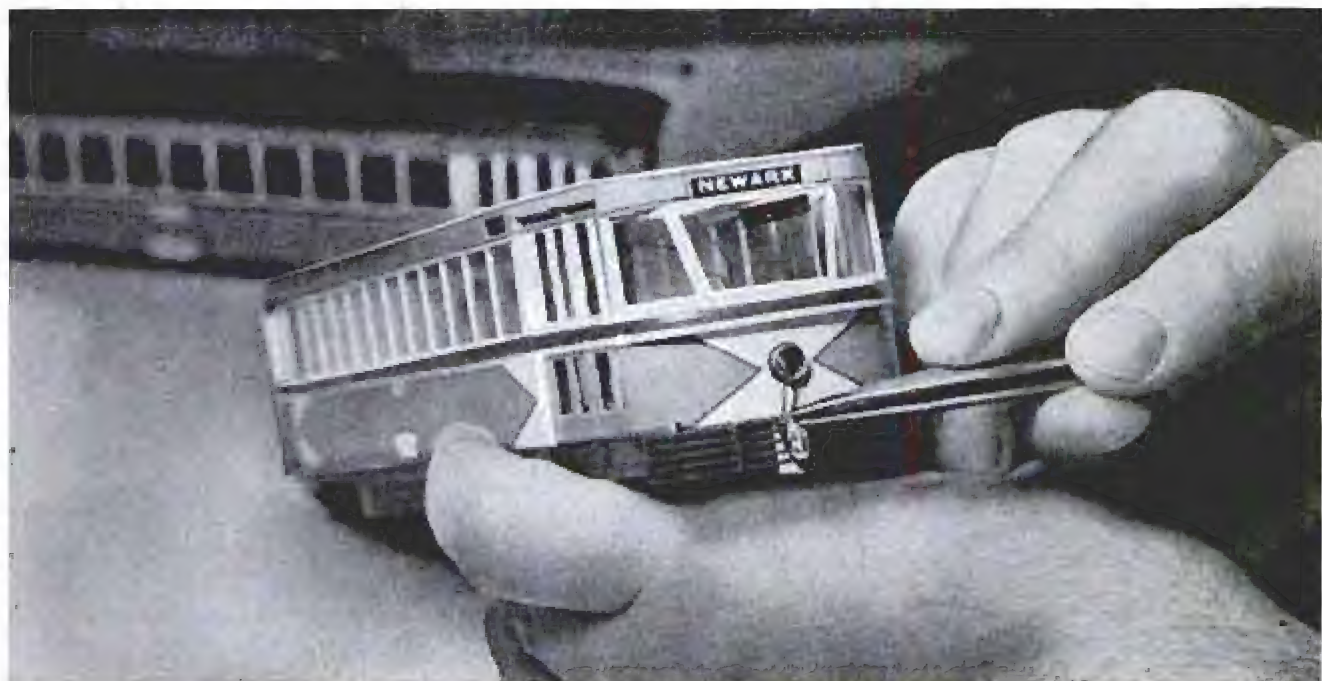
YOU MEAN THESE models are built from paper?" This amazement is often expressed to model railroader William Clouser of St. Louis, Mo. While other hobbyists build models out of metal or plastic, Clouser constructs his from paper or Strathmore board. He says these are the best materials for model-building purposes.

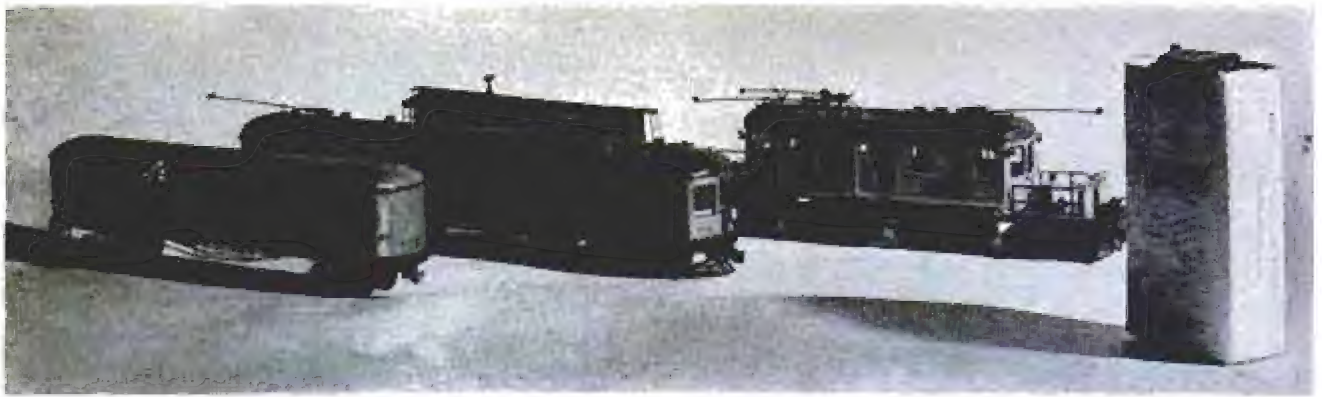
Using one to four-ply Strathmore board, Clouser fashions perfect models in both

HO and O gauge. He works from blueprints, often the very ones used in construction of the prototype. All of his models are noted for their accuracy and ultrafine detail. If something is on the blueprint, you can sure it will be on Clouser's model.

He uses no special tools, only a single-edge razor blade, steel straightedge and sandpaper. He uses his head also—it's his outstanding tool.

Clouser inserts bulb in model of 1927 trolley. Inside walls of headlight housing are chrome plated





These HO-gauge models are as detailed as larger ones. The four-truck model pulls more than 25 freight cars



It took 750 hours to build this train, made from one to four-ply Strathmore board. Its scale is 1/4-inch

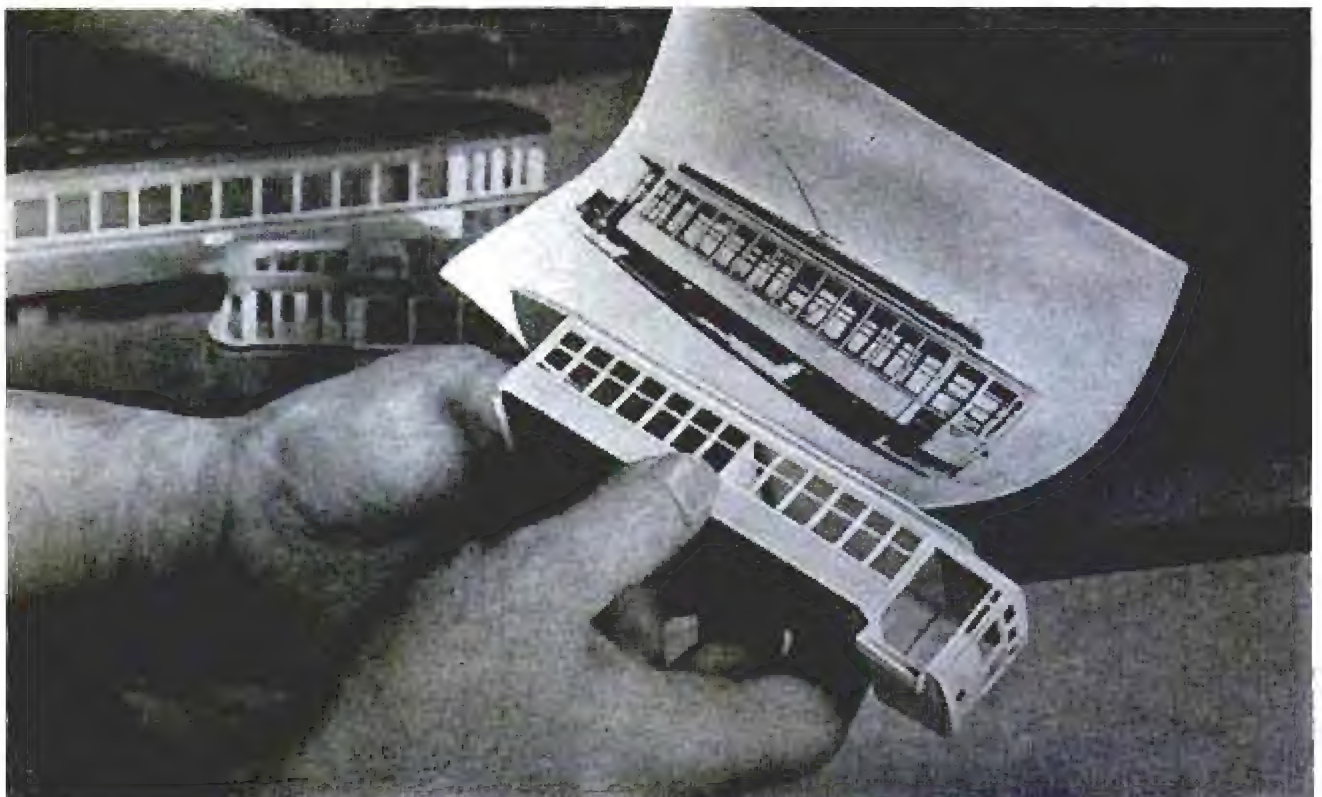
All the models are built to run, and the locomotives will pull as many freight or passenger cars as their prototypes. The cars are weighted to insure proper traction and often weigh as much as seven pounds.

Building model trains since 1945, Clouser now builds industrial models for St. Louis firms. He recently produced a 1/4-inch scale model of a trolley system that operated in the 20s.

Does paper-building represent any special problem? In working with metal or wood, models require no painting except for the sake of appearance. A paper model, on the other hand, must be primed and sprayed when finished so it doesn't warp.

Bill Clouser thinks that more model builders would work with paper if they knew what excellent results are possible with this method. ★ ★ ★

To compare progress of smaller details, Clouser checks model against a photograph of the prototype





Feed Mill on Wheels Grinds and Blends Grains on the Farm

Mobile feed-processing plants now drive into a farmyard and convert a ton of the farmer's own grain into concentrate-fortified and molasses-blended feed in about 10

minutes. Flexible metal tubing "pipes" the finished poultry or livestock feed by pneumatic pressure into the farm's bins up to 40 feet above the diesel-powered mill.

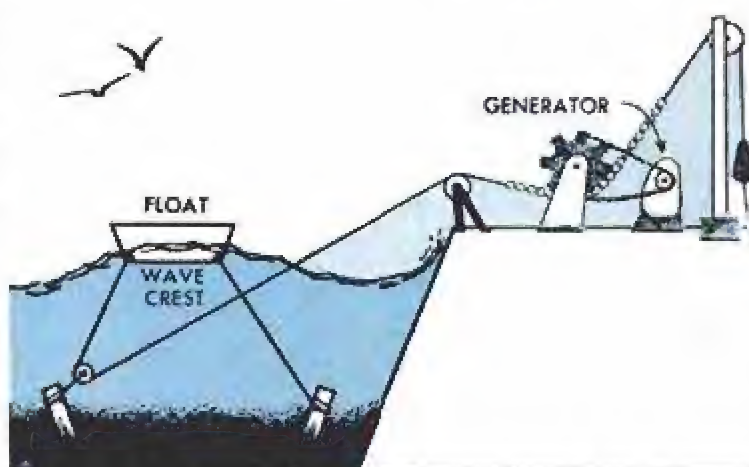
Heat Takes Place of Darkroom

No darkroom is needed to copy black-and-white negatives from color slides, or projection transparencies from black-and-white negatives by a new heat process. The film can be processed in ordinary room light by dipping it in boiling water. No photographic chemicals are required. The special film is coated with a chemical sensitive only to light at the ultra-violet end of the spectrum, such as the light from a mercury vapor lamp. Since the emulsion contains no silver nitrate, it is free of grain. A device similar to a contact printer is available to produce negatives or positives.



"Sea Power" Generates Electricity in Japan

Military engineers in Japan are experimenting with a device that converts the force of ocean waves into electrical power. The mechanism, which has produced up to 50 watts of electricity, consists of a float connected through a series of pulleys and gears to an electric generator on the shore. As the waves move the float up and down, the action is transmitted through a cable to the generator on the shore. The single float is only three feet long and about 18 inches wide but a larger unit may be tested soon.





Hydrofoil Experiments Aim for One-Day Ocean Crossing

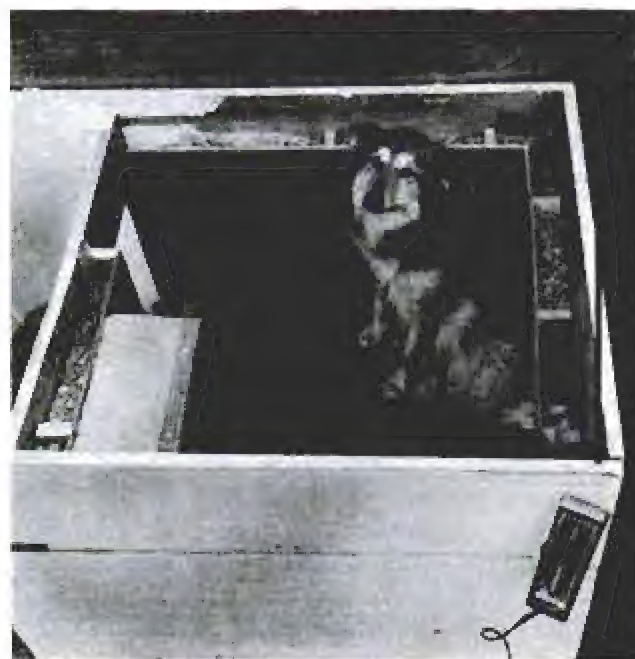
Ships that cross the ocean in one day may be developed from hydrofoil experiments by the Grumman Aircraft Engineering Corporation. The use of hydrofoils, or "sea wings," is not new but applications previously were confined to small vessels. The Grumman study involves craft of up

to 3000 tons that could travel 4500 miles without refueling. The researchers believe a "winged" vessel with a speed of around 115 miles per hour would require less recreation space per passenger than a slower liner. The hydrofoil shown is an experimental Navy craft.

Air-Conditioning, Electric Lights and Veranda: It's a Dog's Life

Crestfallen people may insist, "It's a dog's life." But for Scotty McDonald, a toy collie in Minneapolis, Minn., life is doggoned good. Residing in a pine-paneled bungalow designed especially for her, Scotty has many refinements of human living:

Electric lighting, an elevated veranda and three distinct temperature zones controlled by a thermostat. For summer living, this lucky canine has the comforts of air conditioning. And how many humans have a perfumed bed? Scotty does.



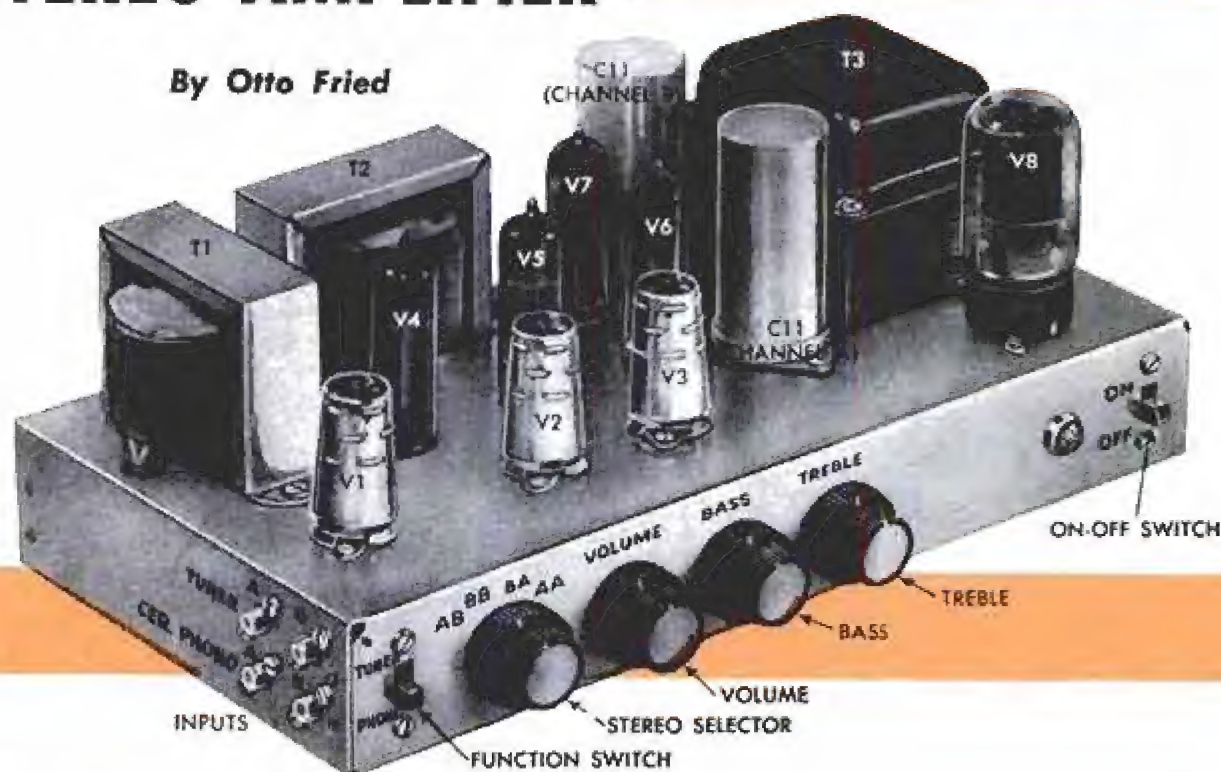
Voltage & Power
Class Amplifier

*For Hi-Fi Enthusiasts
and Audio Hobbyists*

A HIGH-FIDELITY STEREO AMPLIFIER

By Otto Fried

Radio Television Electronics



IF YOU LIKE MUSIC but have so far resisted the temptation to scrap your present phonograph in favor of high fidelity—don't listen to stereo! But, if you already have exposed yourself to the stereo record, you may as well start planning the location of your two speakers—for, no doubt, you will have succumbed to the spell of three-dimensional sound and, whatever your past resistance to hi-fi, it will have been shattered by the magic of stereo.

But stereo, particularly high-fidelity stereo, is likely to be expensive. The dual amplifier and speaker requirements for stereophonic sound reproduction are not compatible with low cost, and the price of a really good stereo system is considerably higher than that of a comparable monaural unit. Money-saving short cuts are possible, of course. For little more than the cost of a stereo cartridge, almost any good monaural phono system can be converted to stereo by employing the amplifier and speaker of a suitable radio or TV set as the second channel (see "Stereo Music at Low Cost," *Popular Mechanics*, October 1958). But the inadequacies of such con-

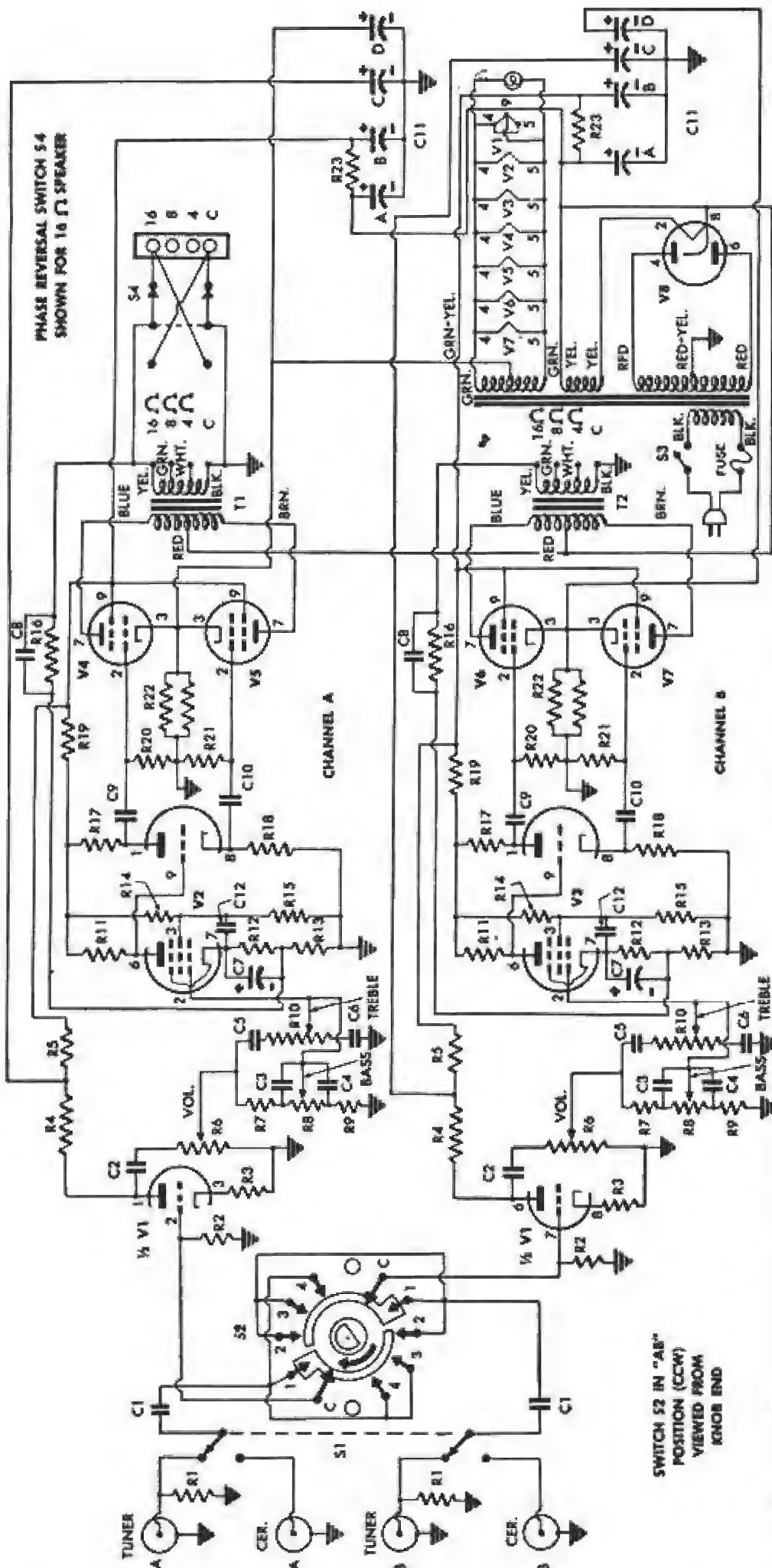
versions, both from a standpoint of fidelity and operating convenience, will soon become apparent. The only uncompromising path to money-saving high-quality stereo is to dust off the tool box and build some of the necessary components yourself.

The amplifier described here, actually two amplifiers in one, combines stereo flexibility with true high-fidelity performance. While not "cheap," its construction cost is far below that of commercially assembled units with similar specifications, and its design is such that a more experienced hobbyist should have little difficulty in duplicating the original model.

No tricky circuitry here. No critical adjustments, hard-to-get parts or added frills which increase costs and complicate operation. Just a straightforward circuit of a dual amplifier, using a common power supply, with sufficient power to fill even the largest living room with clean, undistorted sound.

Why a Stereo Amplifier Is Different

The principal difference between a stereo amplifier and a monaural one is the fact that the former has two complete and

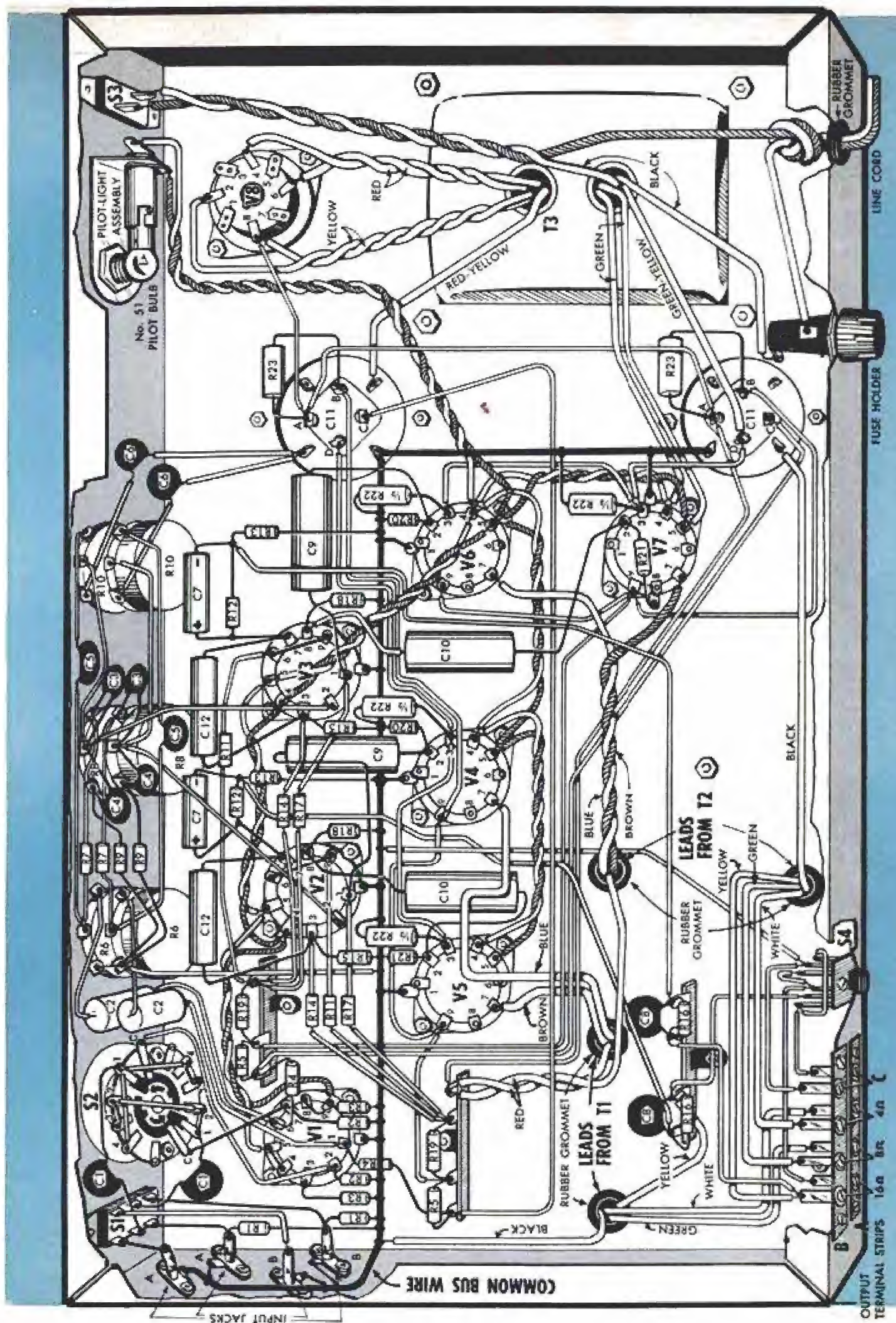


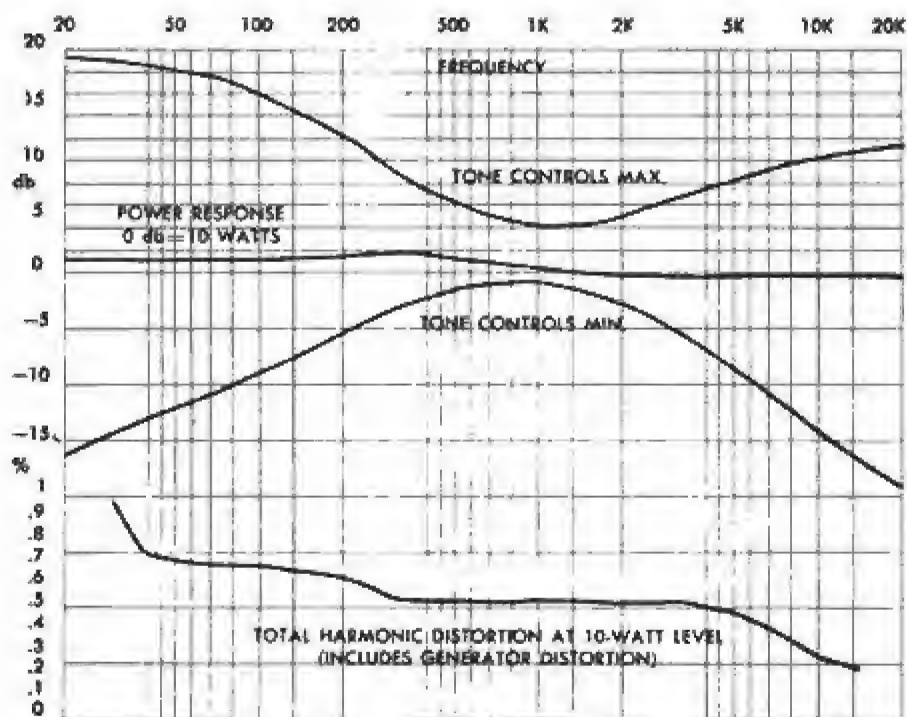
LIST OF MATERIALS

wise specified. Values given in mfd. 2 sets of the following values are required. C1—0.02; C2, C12—0.1; 400-v. tubular; C3—0.001; C4—0.01; C5, C8—0.00047; C6—0.003; C7—50.0; 10-v. electrolytic; C8, C10—0.05; 400-v. tubular; C11—4-section electrolytic, sections A, B, C are 40 mfd./450-v. section D is 40 mfd./25-v. TUBES: V1—12AU7/6X4; V2, V3—6X4; V4, V5—6X4; V6, V7—6X4; V8—5V4GA. TRANSFORMERS: T1, T2—output, (primary impedance—8000ct. sec.-4, 8 and 16 ohms), Triad type S-31A; T3—power (plate-700vct. 200 ma., filaments—5v./3a. and 6.3 vct./6 a.) Thordarson type 23R07.

RESISTORS: (All resistors are 1/2-watt $\pm 10\%$ unless otherwise specified, $K = 1000$ ohms, $M = 1,000,000$ ohms, 2 sets of the following values are required): R1, R15—100K; R2—2.7M; R3—6.8K; R4, R7—220K; R5—470K; R6, R8, R10—1M; R11—10K; R12—10K; R13—47K; R14—1M; R16—2.7K; R17, R18—270K (1% or matched pair); R20, R21—330K; R22—165, 4 watts (2 330-ohm, 2-watt resistors connected in parallel); R23—2.2K, 2 watts. **CAPACITORS:** (All are disk ceramics unless other-

SWITCHES: S1, S4—d.p.d.t. slide switch; S2—2 pole, 5 position rotary switch, shorting type (5th position lug not used); S3—s.p.s.t. slide switch. **MISCELLANEOUS:** Chassis, 2 x 7 x 13-in. steel or heavy-gauge aluminum; 9-pin min. tube sockets, (4); 9-pin min. tube sockets with shields, (3); (all min. sockets are saddle type), octal tube socket; plot-light assembly; No. 51 bulb; line cord with a.c. plug; phonograph input jacks, (4); type 3AG, 2-amp. fuse and fuse holder; 4-term. output terminal strips, (2); No. 14 tinned bus wire; 4-lug terminal strips, (2); rubber grommets, (5); dual knobs for controls, (3); matching knob for switch.





SPECIFICATIONS

RATED POWER—

10 watts per section

FREQUENCY RESPONSE—

20-20,000 c.p.s. ± 1 db

HUM AND NOISE—

68 db below rated power

TOTAL HARMONIC DISTORTION—

See curve

SENSITIVITY—

0.3 volt

independent amplifier channels. There are, however, other differences which contribute to operating convenience and stereo flexibility. These are associated with the input switching arrangement and can readily be seen from the schematic diagram on page 158.

Note that the amplifier has four input jacks. Two of these, labeled TUNER and CER. PHONO, are associated with the A amplifier channel while their counterparts are associated with channel B. The TUNER jacks are intended to receive the output plugs from separate AM and FM tuners, and the CER. PHONO jacks receive the two separate output cables from a ceramic phono cartridge.

With switches S1 and S2 in the positions shown, one TUNER input jack is connected to amplifier channel A and the other to channel B. This permits the reception of stereophonic broadcasts which are available in many sections of the country on a limited but regular basis. With S1 in the CER. (down) position, the two elements of a stereo phono cartridge are connected to separate amplifier channels for the reproduction of stereo records. This same position gives excellent results when playing monaural records with the stereo cartridge. While monaural records cannot produce true stereo sound, the use of two amplifiers and speakers adds a pseudo-stereo effect which can be surprisingly realistic.

The stereo selector switch, S2, has four positions. Its function in the first or AB position has just been described. In the second position, labeled BB on the front panel, the switch applies the signal from the B TUNER jack to both amplifier sections simultaneously. This inserts the pseudo-

stereo effect to the program of whatever tuner is connected to this jack. The pseudo-stereo effect can be further enhanced by unbalancing the separately variable tone controls, thus applying a predominance of bass tones to one speaker and accentuated "highs" to the other.

Position BA is often called "stereo reverse." For stereo material, this position effectively reverses the two halves of the orchestra, either to place them in their proper perspective, or purely for demonstration purposes.

Finally, the AA position of the switch applies the signal from tuner A to both amplifier sections to give monophonic reproduction from tuner A.

Other stereo requirements included in the amplifier are separate volume controls for each channel and independently variable bass and treble controls. These permit balancing of the two stereo signals and compensating for possible variations in the response of the two speakers.

A phase-reversal switch, S4, is included to permit instantaneous reversal of one of the speaker voice coils. With any multiple-speaker system it is essential that all speaker cones vibrate exactly in step with each other. If a given signal were to cause one cone to move forward and the other backward, cancellation of the signal would occur in some parts of the room. Switch S4 provides a quick, convenient means for phasing the two speakers. A slow trip around the room while listening to a monaural signal source will leave little doubt as to which is the correct switch setting.

The performance of any amplifier can

(Continued to page 240)



CHAIR



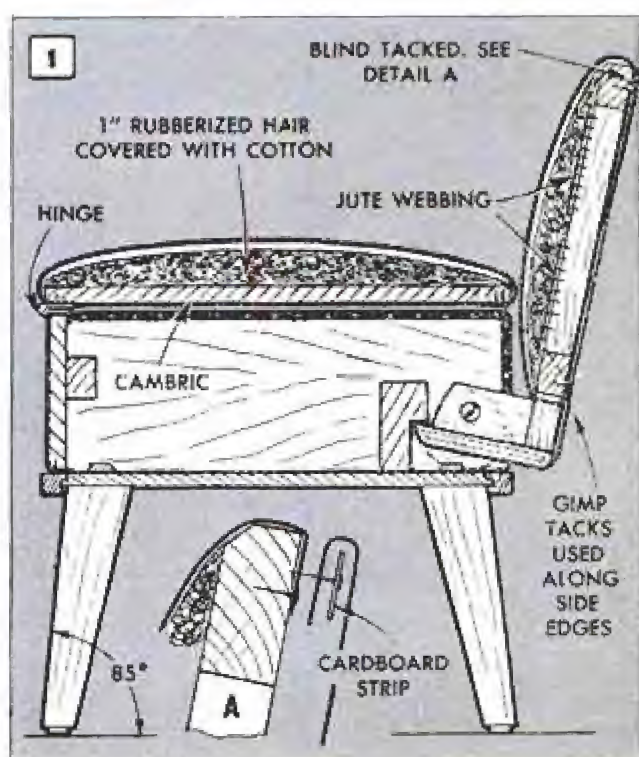
STOOL



STORAGE

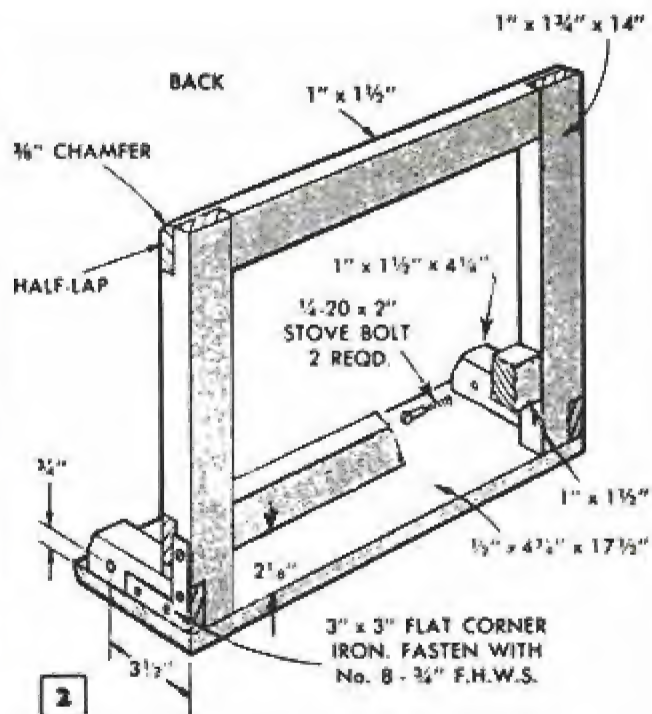
STOOL CONVERTS TO TV CHAIR

LIFT THE LID of this ordinary looking footstool and it becomes a novel TV chair almost as quickly as you can say John Bergen, top furniture stylist who designed it. In addition to its double-duty feature, it affords handy storage space for sewing, a book or two or your playing cards. The interior view, Fig. 1, shows how the folding back is supported in the open position by hooking under a rabbeted hardwood crossrail. When in the closed position, the back folds flush inside the stool. Two $\frac{1}{4}$ -20 stove bolts, turned into Teenuts from the inside, pivot the chair back. These are special nuts which serve as threaded bushings and which mount almost flush on the outside. It is important in drilling the pivot holes in both the back chair and stool sides that they be positioned exactly as indicated. Best way to assure this is to clamp the back (before it is upholstered) to the stool in its open position and drill through both at one time from the outside. Fig. 2 details the construction of the back. You'll

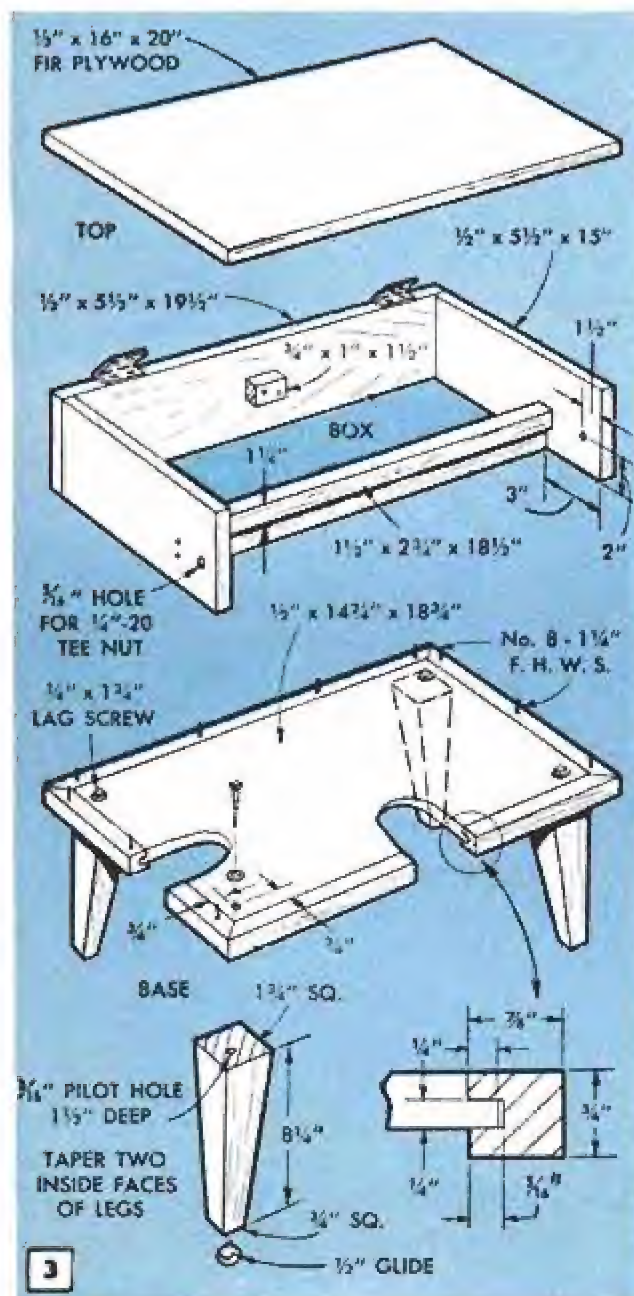




Half-lapped frame members for the folding back are rabbeted crosswise and then ripped to right width



2



3

notice that the members are half-lapped and strengthened at the corners with flat corner irons. The rear side board of the box is made narrower than the others so the back will swing clear of the bottom and the heads of the lag screws which fasten the legs. Regular jute furniture webbing is applied to the face side of the back, interlacing two strips one way and three the other. Fold the webbing at the ends so you tack through two thicknesses.

The rest of the stool is made following the details in Fig. 3. Since the edges of the base are left exposed, the plywood edges are faced with hardwood edging. This fits over rabbeted edges, is mitered at the corners and is the same stock as the legs. The legs are splayed in just one direction, starting out by angle-cutting the ends 85-deg. and then tapering two adjacent faces from 1 3/4 in. sq. at the top to 3/4 in. sq. at the bottom. Glue, plus lag screws, fasten the legs. The box part of the stool is "up-

MATERIAL LIST

Fir Plywood

- 1 pc. 1/2" x 16" x 20"—Lid
- 1 pc. 1/2" x 14 3/4" x 18 3/4"—Bottom
- 2 pcs. 1/2" x 5 1/2" x 15"—Sides
- 1 pc. 1/2" x 5 1/2" x 19 1/2"—Front
- 1 pc. 1/2" x 4 3/4" x 17 1/2"—Back

Hardwood

- 1 pc. 3/4" x 7/8" x 72"—Bottom edging
- 4 pcs. 1 3/4" x 1 3/4" x 8 1/4"—Legs
- 1 pc. 1 1/2" x 2 3/4" x 18 1/2"—Rabbeted rail
- 1 pc. 3/4" x 1" x 1 1/2"—Stop block
- 2 pcs. 1" x 1 3/4" x 14"—Back posts
- 2 pcs. 1" x 1 1/2" x 17 1/2"—Back rails
- 2 pcs. 1" x 1 1/2" x 4 1/4"—Back blocks

Miscellaneous

- 4 Lag screws 1/4" x 1 3/4" with 1/4" washers
- 2 Hinges 1" or 1 1/4" x 3" open
- 2 Tee nuts 1/4"-20
- 2 Roundheaded stove bolts 1/4"-20 x 2"
- 2 Flat corner irons 3" x 3" with No. 8 x 3/4" screws
- 36' Jute furniture webbing
- 1"-thick rubberized hair for seat and back
- Upholsterer's cotton and cambric
- 1 1/2 yds. upholstery, 54" wide

holstered" on the outside and brought over and around the top and bottom, as well as the end edges, before attaching it to the base from underneath with No. 8-1 $\frac{1}{4}$ -in. flatheaded screws. A study of Fig. 1 will show how the seat and the back are padded and covered. In the case of the back, the front side is upholstered first, covering the webbing with a piece of burlap, then with rubberized hair, then with cotton and finally with fabric. The back is covered (without padding) by blind-tacking the fabric along the top edge first and then bringing it smoothly down around the edge that hooks under the rabbeted cleat. Gimp tacks are used to fasten the fabric along the sides. The back is installed after it is completely upholstered. Cambric is applied to the underside of the upholstered seat to cover the exposed wood. A pair of butt hinges is used to hinge the top, and a hemmed check strap, about 1 in. wide, is added to the lid to keep it from opening too far and breaking off. ★ ★ ★



Pendant on Slide Fastener Permits Grasping With Glove

Sportsmen in heavy winter garb usually find it necessary to remove a glove to grasp the tab of a slide fastener on their jackets. This is not necessary if a pendant is attached to the tab, and you'll find a tear-drop lead fishline sinker makes a neat pull that is easy to grasp with glove or mitten.

New Spark Plug Burns Hotter And Cleaner at Low Speeds

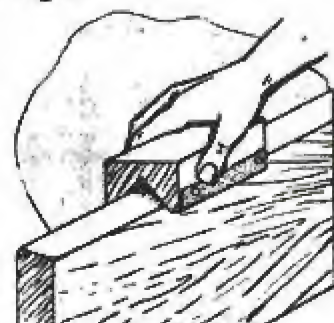
In today's modern high-powered cars, engines are "loafing" at normal highway speeds. At 50 m.p.h. you are traveling at about half the top speed of your car. In congested traffic, your engine slows down and sometimes continues at idle speeds over long periods of time. A spark plug designed strictly for fast driving would probably foul when suddenly plunged into the cooler temperatures of slow speed which allow carbon and oil deposits to accumulate on the firing tips. New developments in spark-plug design, however, are helping to offset these problems. An example of this is the projected core-nose design, which extends the insulator tip farther into the cylinder. It runs hotter at low speeds to help prevent deposits from forming. At high speeds the extended core-nose receives extra cooling from the incoming air-fuel mixture.

Removing Wall Stud

When installing a flush wall cabinet, such as a medicine cabinet, and a portion of a wall stud must be removed, the ticklish job of removing it after sawing it off so as not to damage the plaster on the opposite side, can be accomplished with a hacksaw blade. Here, the blade itself is used to saw off the lath nails driven into the stud. First gently pry the stud away from the lath to let you work the blade through behind it. Then saw back and forth, cutting through each nail as you come to it. It is best to wear gloves to prevent skinned knuckles.

Breaking Sharp Edges

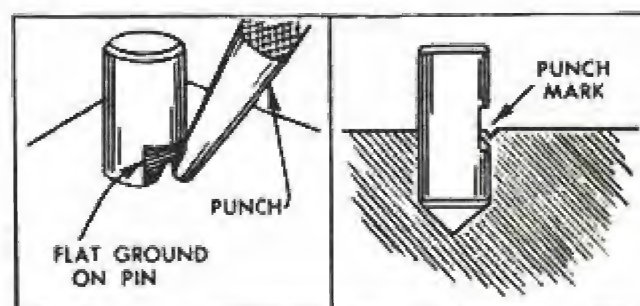
Sharp edges on cabinet work can be removed twice as fast with a V sanding block. Cement the abrasive to the V surfaces so it will conform to the shape of the block. Fine sandpaper works best.



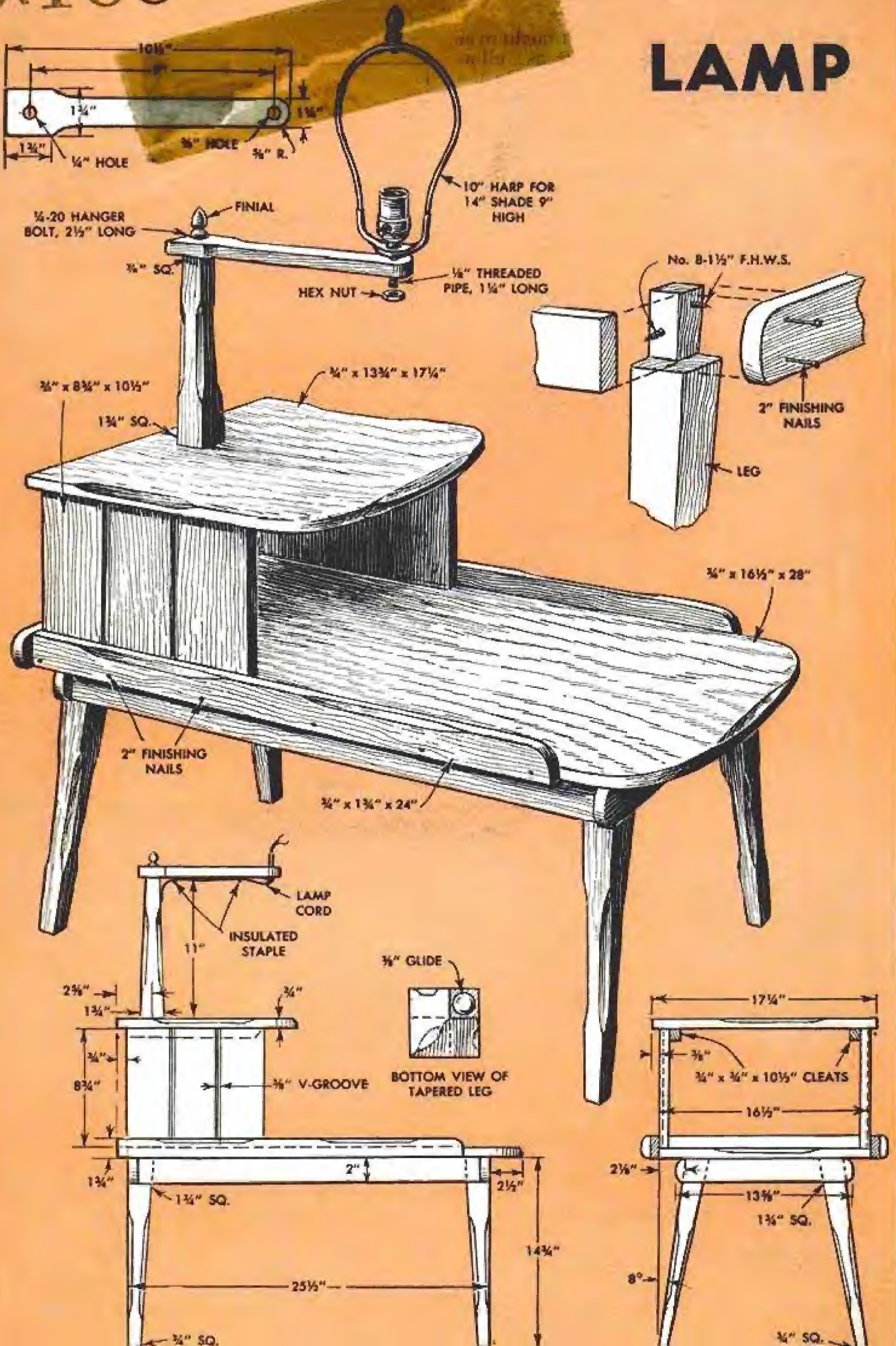
Steel Dowels Locked Securely By Upsetting Metal in Notch

Toolmakers using steel dowels for building jigs and fixtures and also for locating, sometimes find dowel holes slightly over-size in which the dowel is a slip fit rather than the light drive fit required. Rather than discard the work or take the time to turn and grind a dowel to fit, some toolmakers grind a shallow flat on the side of the dowel, insert it in the hole and then punch-mark the metal adjacent to the flat. The resulting projection holds the dowel.

Frank LaSaracina, New York City.



LAMP



TABLE



IF YOU HAVE a yen toward the warmth and charm of colonial furniture, you'll want to add this quaint-looking piece to your furnishings. It's the perfect accent piece and doubly useful, too, in that it combines a cobbler-bench step table with a handy swinging lamp.

You have a choice of making it from white pine, maple or cherry. Note that the edges are relieved here and there with a chisel to simulate a worn, antique effect. Material for the tops, as well as the sides of the table, must be glued up for width from random widths of solid stock. One end of each top piece is rounded while the opposite end is cut square. Cleats are used to join the sides to the step top, screws from below fasten the sides to the table top. The understructure consists of a 2-in. frame on edge which is attached with screws placed in counterbored holes. You'll notice that the legs are tapered on two faces only and are splayed in just one direction. The upper ends are shouldered to fit the inside corners of the underframing where they are fastened with glue and screws. A short length of $\frac{1}{8}$ -in. electrical

pipe and nut hold the socket at the end of the swinging arm, the cord being stapled to the underside. A standard hanger bolt, which looks like a wood screw at one end and threaded for a nut at the other, is used to pivot the arm to the lamp post. A $1\frac{3}{4}$ -in. apron applied to three sides of the top completes the table. ★ ★ ★

MATERIAL LIST

Note: Lumber may be white pine, maple or cherry. Top and shelf may be of cabinet plywood

Lumber

- 4 pcs.— $1\frac{3}{4}$ " x $1\frac{3}{4}$ " x $15\frac{1}{2}$ "—Legs
- 2 pcs.— $\frac{3}{4}$ " x $2\frac{1}{8}$ " x 24 "—Side leg rails
- 2 pcs.— $\frac{3}{4}$ " x 2 " x $13\frac{3}{8}$ "—Front and back leg rails
- 1 pc.— $\frac{3}{4}$ " x $16\frac{1}{2}$ " x 28 "—Step top
- 2 pcs.— $\frac{3}{4}$ " x $1\frac{3}{8}$ " x 24 "—Step-top sides
- 1 pc.— $\frac{3}{4}$ " x $1\frac{3}{8}$ " x $18\frac{3}{4}$ "—Step-top back
- 2 pcs.— $\frac{3}{4}$ " x $8\frac{3}{8}$ " x $10\frac{1}{2}$ "—Side panels
- 2 pcs.— $\frac{3}{4}$ " x $\frac{3}{4}$ " x $10\frac{1}{2}$ "—Fastening cleats
- 1 pc.— $\frac{3}{4}$ " x $13\frac{3}{8}$ " x $17\frac{1}{4}$ "—Top
- 1 pc.— $1\frac{3}{4}$ " x $1\frac{3}{4}$ " x 11 "—Lamp post
- 1 pc.— $\frac{3}{4}$ " x $1\frac{3}{4}$ " x $10\frac{1}{2}$ "—Lamp arm

Miscellaneous Hardware

- 4— $\frac{5}{8}$ "-dia. furniture glides
- 1— $\frac{1}{4}$ "-20 hanger bolt, $2\frac{1}{2}$ " long
- 1— $\frac{1}{2}$ " threaded pipe, $1\frac{1}{2}$ " long
- 1—Hex nut to fit threaded pipe
- 1—10" lampshade harp
- 1—electric socket, push-button type
- 1—electric-cord plug
- 1—electric cord, 6 ft. long
- 2—lampshade finials
- 1—14"-dia. lamp shade, 9" high

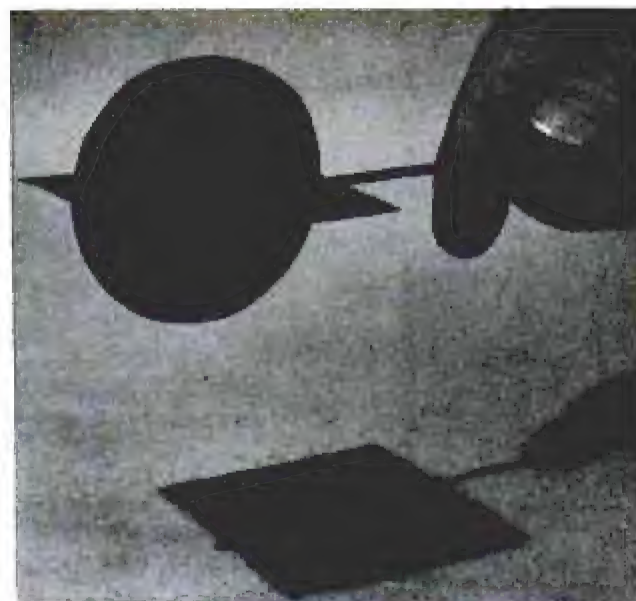
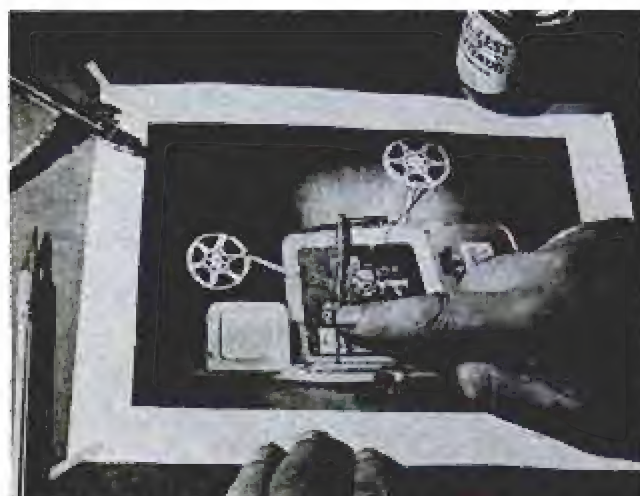


Pretreated Photo Sponges Absorb Water Readily

When cellulose sponges used for photographic purposes become hard, they can be softened so they absorb water readily by pretreating in a solution of several drops of wetting agent mixed with a few ounces of water. After using the sponges, squeeze out the water, dip in wetting solution and wring out again. Treated sponges will dry normally and soften immediately in water.

Emergency Retouching Frisket Made With Rubber Cement

When no frisket paper is available for use on photographs that are to be retouched with an airbrush, rubber cement can be used as an excellent substitute. Two coats of the cement, thinned to working consistency, should be applied to assure complete coverage of the area to be masked. When the retouching has dried, the rubber cement can be removed by "rolling" it off with a soft, dry cloth. As the cement is removed, it also cleans the surface.—Robert L. Hay, Rochester, N. Y.



Square or Round Shadow Cast By Print-Dodging Tool

For controlled print exposure while making enlargements, this novel dodging tool can be turned to cast either a square or a round shadow. Cut a square and a round shape from heavy black paper, then cut down the center of each halfway so they may be joined at right angles as shown. Cement them to a length of wire which serves as a handle.

Meter and Filters Carried Along With Camera Case

When you take your camera on location, you can avoid a last-minute search for mislaid equipment, such as a light meter, lens shade and filter case, if these items are kept attached directly to the camera case. Cut slits in the backs of the accessory cases and thread them onto the shoulder strap of the camera case. While you are doing this, it would be a good time to check to make sure the camera strap and buckles are in good condition.

Ron Anderson, Minneapolis, Minn.



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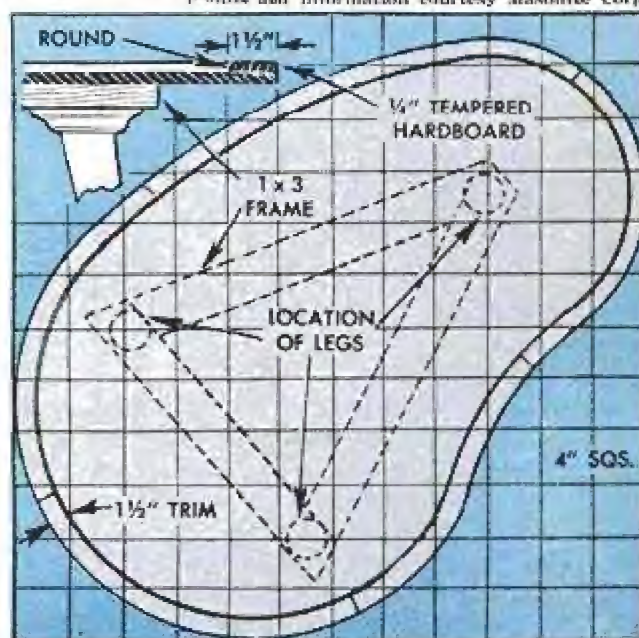


Photos and information courtesy Masonite Corp.

FREE-FORM COFFEE TABLE

THIS MODERNISTIC coffee table, which any homemaker would be proud to have in her living room, can be made in one evening from a 4 x 4-ft. panel of $\frac{1}{4}$ -in. tempered hardboard and 1 x 3-in. furring stock. The 16-in. tapered wooden legs can be purchased at most lumber-supply stores, or they can be turned from hardwood stock, if suitable wood-turning equipment is available. First make a full-size pattern of the table top on wrapping paper, outlining the positions for the 1 x 3-in. frame and legs as shown in the squared drawing. Then trace an outline of the table top on the hardboard panel and cut it out with a scroll or saber saw. If the cutting is done carefully, most of the $1\frac{1}{2}$ -in. border-trim pieces can be cut from material adjacent to the cutout line to save marking and cutting both edges of these pieces. For places where sufficient material is lacking, the trim can be cut from scrap pieces. The inside edge of the trim is given a 10-deg. bevel for easier cleaning before gluing it to the top.

After cutting the framing pieces to size, they are glued to the underside (rough



side of the hardboard) of the table top. The framing members strengthen the top and provide a suitable base to which the legs may be attached as indicated in the details. The top can be left in its natural finish and waxed or varnished, or it may be painted to match the decor of the room. More colorful effects can be obtained by covering the top with mosaic tile, which should be glued to the hardboard and grouted. The table shown in the photo was primed and finished with light-colored texture paint.

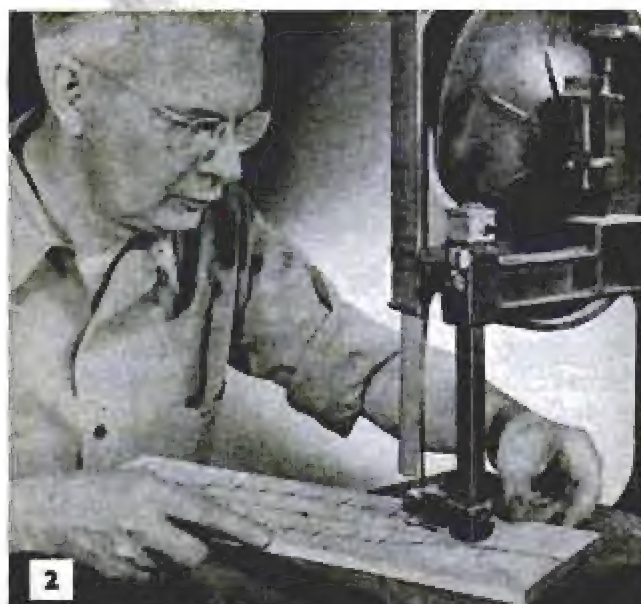
X432



MODELING THE FRENCH *CHEBEC*

By E. R. Haan

PART I—Shaping the hull



Saw the lifts slightly outside the line. You can use either a bandsaw or jigsaw, even a coping saw

FAITHFULLY reproduced in exquisite detail by skilled craftsmen in the workshops of the French Navy's famous Musée de la Marine in Paris, this beautiful scale model is an authentic copy of the French warship *Chebec* which was one of several of the xebec class that distinguished themselves by many daring exploits during the years from A. D. 1650 to 1700. Highly picturesque and colorful, these beautiful ships somewhat resembled galleys because of their high sterns, but were much easier to maneuver, a definite advantage in naval encounters of that time. After serving magnificently in the Royal Navy, these renowned ships survived nearly another half century as fishing boats. The model shown in Fig. 1 is 26½ in. long, about ⅓ the size of the actual ship, which mounted 24 six-

pounder cannon and 34 two-pounder blunderbusses.

Tracing the Lifts

To model the Chebec start with the lifts, Fig. 3. These are $\frac{1}{16}$ in. thick except lift A which is $\frac{1}{8}$ in. However, you can use a single lift $\frac{1}{16}$ in. thick for both A and B, cutting it to the shape of B.

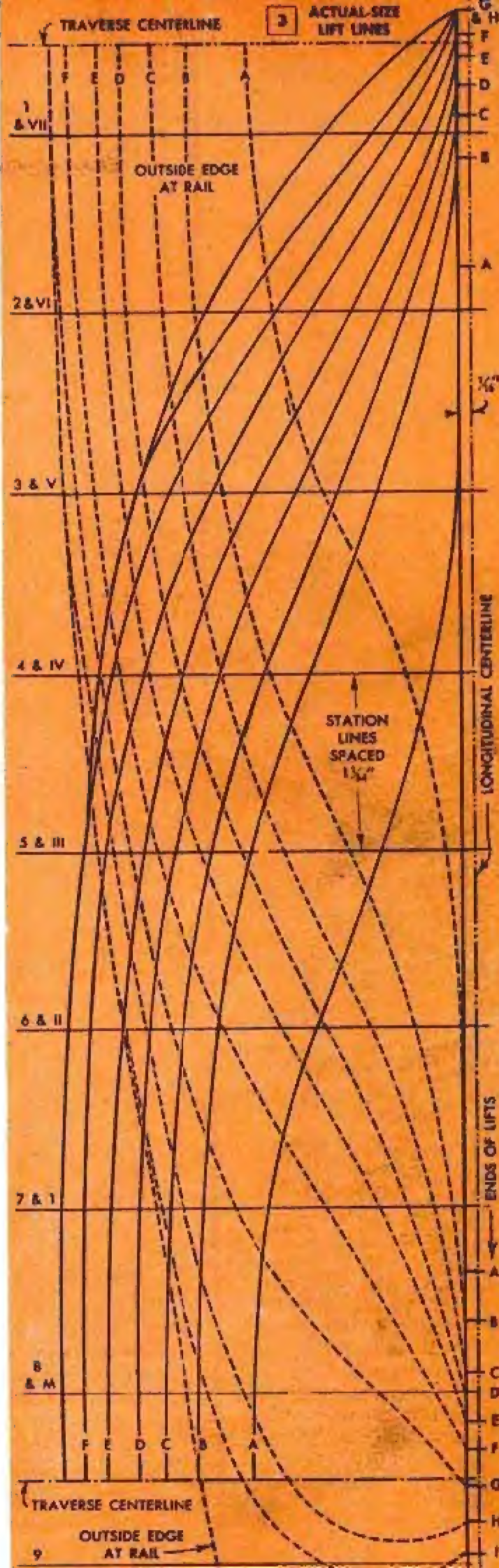
Cut out Fig. 3, which gives actual-size lift lines. Here, the lift lines ahead of the traverse centerline are superimposed over the lines aft. The former are solid and the latter dotted. They are to be joined end-to-end when traced on a piece of kraft or other strong paper to make a full-length but half-width pattern. Lay the fore half of the printed cutout to register on an 18-in. longitudinal centerline first marked on the kraft paper. Fasten one end of both sheets down on a drawing board with thumbtacks or removable tape. Place carbon paper face down on the paper and also place carbon paper face up under it before fastening the other end of the sheets to the board. Now trace the solid lift lines as well as the station lines and centerlines. Station M is about amidships. Those forward are marked with Roman numerals and those aft with Arabic numerals.

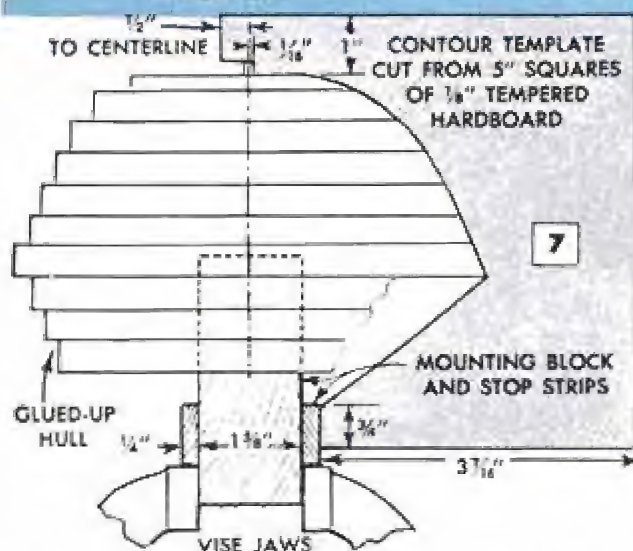
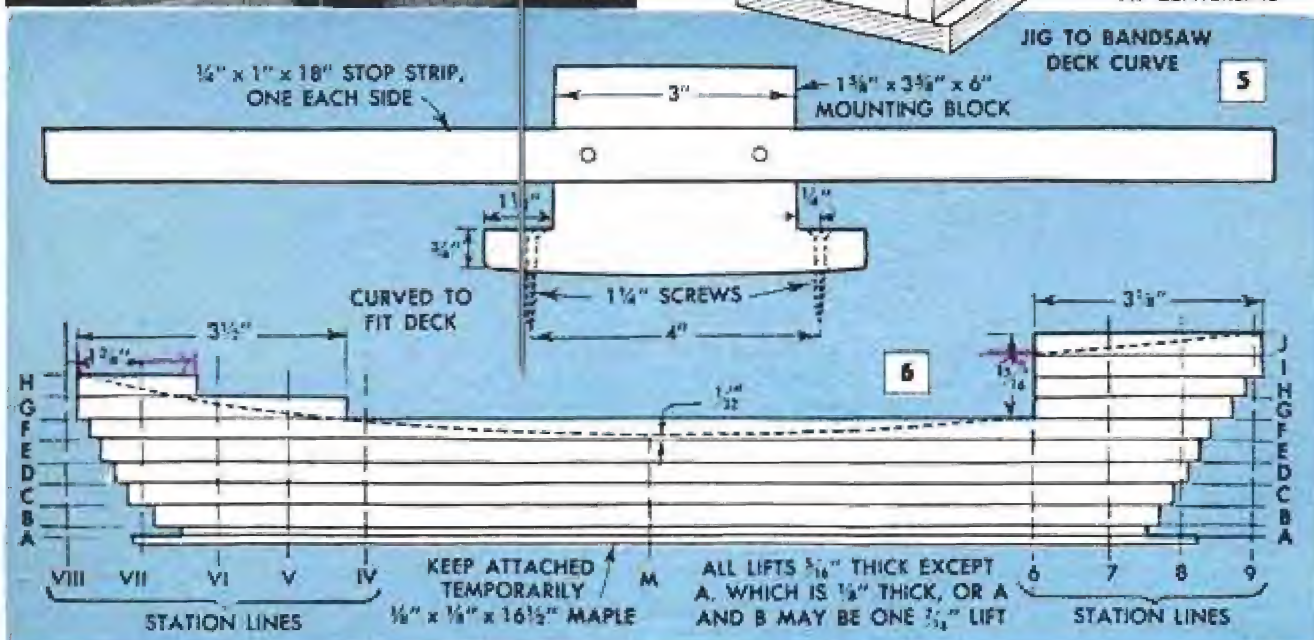
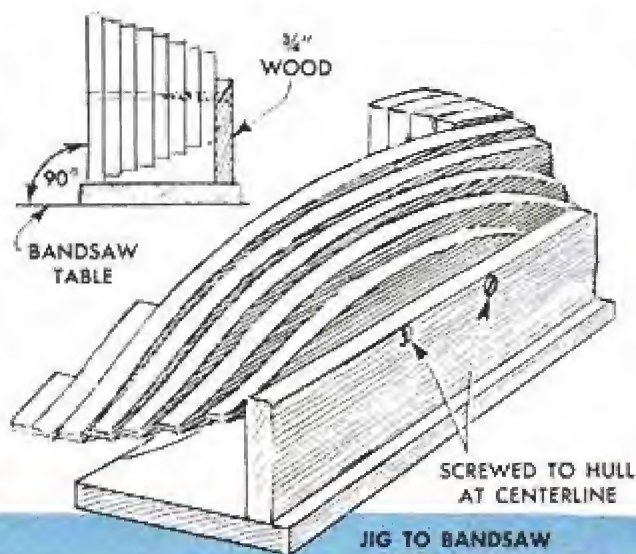
Next, move Fig. 3 down until both the traverse and longitudinal centerlines are in register and continue tracing on the dotted lines with a sharp pencil. Turn the pattern over and adjust it on the opposite side of the centerline to trace the second half width. Lift lines A to F are reproduced completely, but only the fore portions of G and H, and the aft portions of G, H, I and J, according to lengths given in Fig. 6. Saw carefully about $\frac{1}{32}$ in. outside of the lines, best done on a bandsaw as in Fig. 2. Mark the station lines on the edges of the lifts and also the longitudinal centerline at their tips.

Assembling Lifts

You can use $\frac{1}{4}$ or $\frac{3}{8}$ -in. dowels to keep the glue-coated lifts from shifting when squeezed together with clamps. Drill the dowel holes vertically at the centerline $\frac{5}{8}$ in. aft of stations II and 2 so the dowels will be concealed by deck fittings. The holes should not go through the bottom lift. Drill the holes while the lifts are clamped together in perfect alignment, but not yet coated with glue. After drilling, apply waterproof glue and clamp the lifts as in Fig. 4. Partial lifts G, H, I and J at the stern are similarly doweled to the hull at the same time or later.

When the entire assembly has dried overnight, pencil the deck-curvature line on each side. This should be the curvature





at the deck center as given in Fig. 11. You can bandsaw the curvature by using a jig detailed in Fig. 5. The lower edge of lift F should rest firmly on the base of the jig. The screw holes will be concealed by the keel. After the curvature of both main and poop decks have been cut, lightly restore the centerline and lift lines on the new surfaces so later sanding will remove them. The job of crowning the deck—sloping it toward the sides—is done later.

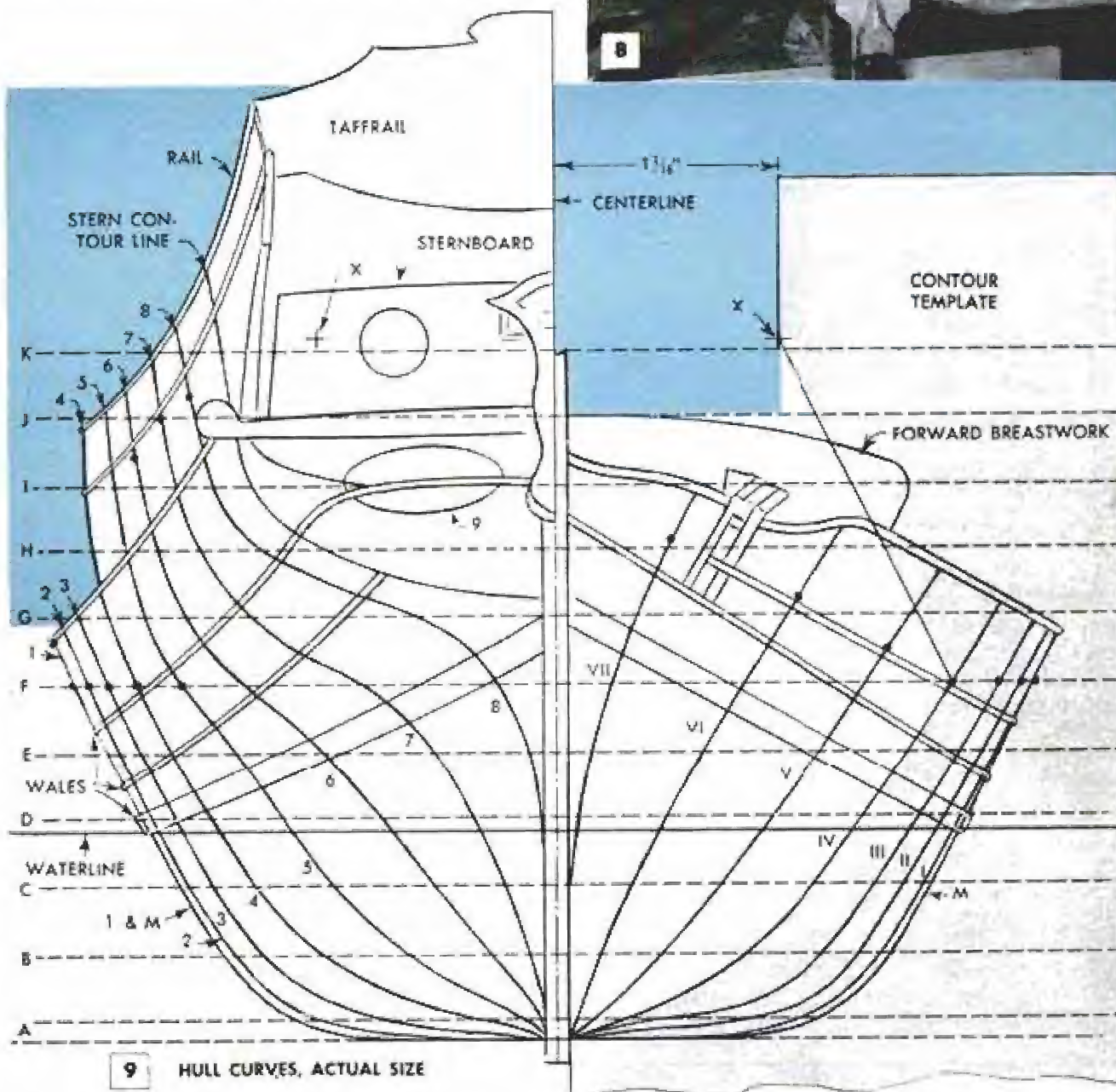
Fit the hull at the center with a mounting block, Fig. 6. This, when chucked in a vise, holds the hull bottomside up. Drive the two screws 4 in. apart so they enter the hull just aft of the dowels where the screw holes will be covered later. Two straight strips of $\frac{1}{4} \times 1$ -in. wood are nailed to the mounting block to serve as stops for using contour templates where hull shape is to be checked. A temporary $\frac{1}{8} \times \frac{1}{8}$ -in. keel, and also a stem and sternpost, $\frac{1}{8}$ in. thick, of close-grained hardwood, will serve as guides for dressing down the hull, and also help to prevent cutting away too much wood near them. Pilot holes for brads through these parts prevent splitting. Also mark the station lines on the keel.

Contour Templates

The contour of the hull is checked while shaping it by means of templates. These are cut from 5-in. squares of $\frac{1}{8}$ -in. tempered hardboard. Each template shows the hull curvature from keel to the top of the bulwark at a particular station line. All the contour lines are given in Fig. 9. Trace this pattern on paper from which you can reproduce one contour line on each tem-

plate blank. In doing the latter, the contour line goes up as high as the dot. Then a straight line goes from the dot to point X, and from this a straight line runs parallel to the vertical centerline, $1\frac{1}{16}$ in. from it. Saw alongside the lines in the waste.

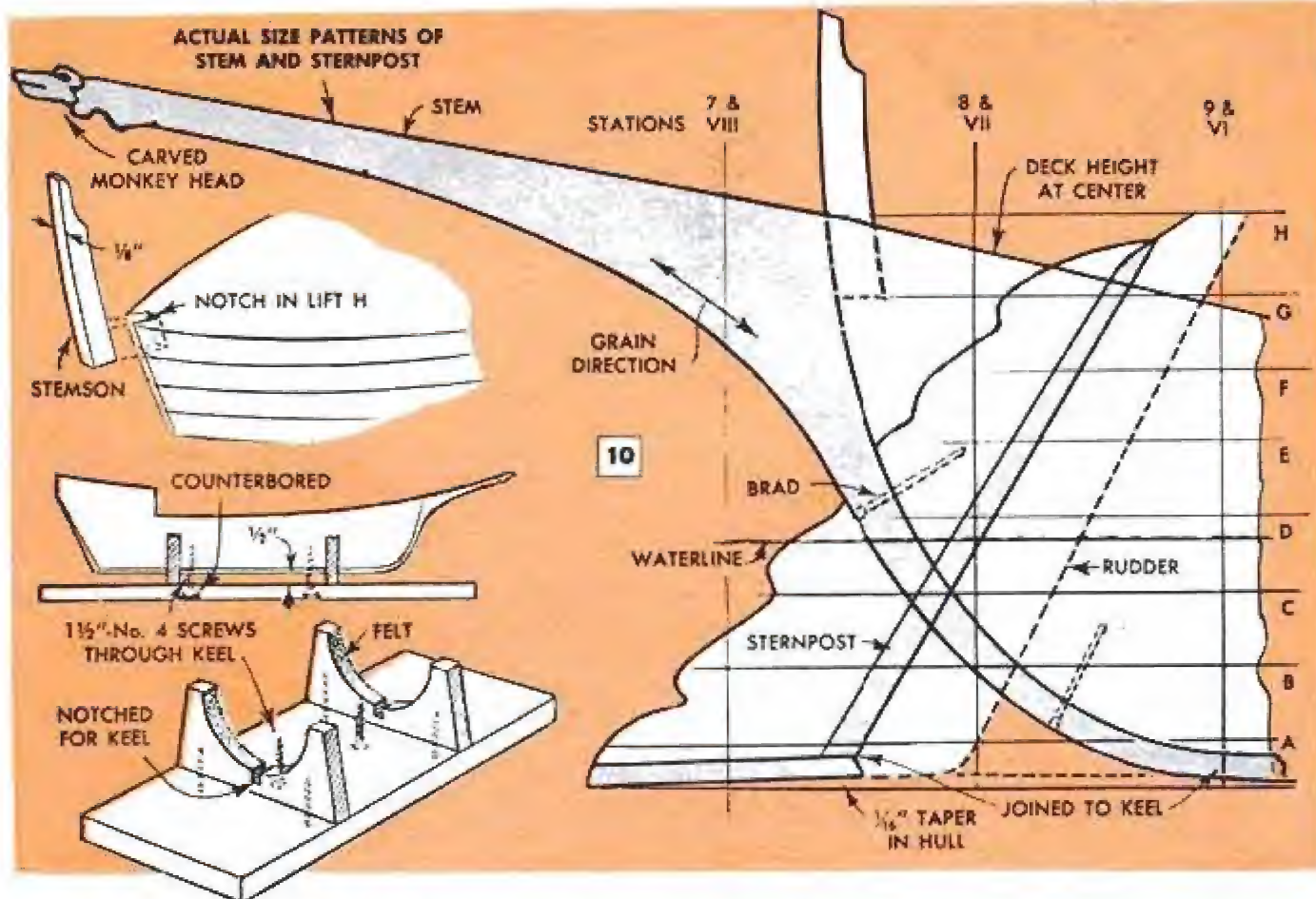
Shaping the hull starts with removing excess wood from the lifts with a spokeshave as in Fig. 8. A thumb plane, chisel, gouge and coarse file, whichever is most convenient, can be used as you progress. Start cutting from station M in both di-



rections, over a distance of several stations. When the final contour is being approached, you can locate high spots by rubbing chalk or crayon on the edges of the templates and moving them sideways a trifle against the hull to mark it. Final finishing is done with Nos. 1, 0 and 2-0 sandpaper. Templates should fit snugly against the keel and the stop strips as shown in Fig. 7 when held at the station lines.

After shaping the hull, remove the tem-

porary keel, stem and sternpost which likely will be marred from cutting. Before substituting the permanent ones, also of close-grained hardwood, taper the bottom of the hull at the centerline a scant $\frac{1}{16}$ in. from station III forward and from station 3 aft, as indicated in Fig. 10. Fasten the new pieces with glue and brads. Before installing the stem, carve the figurehead and notch tip of hull to accommodate the stemson. Stem and stemson need not be



separate pieces as shown in Fig. 10, but may be a single unit cut.

The sternpost and rudder also may be a single piece, in which case this is shaped and installed after the sternboard of the poop deck has been installed. If a separate, movable rudder is desired, it is attached later, and only the sternpost is installed at this time. Following this, remove the mounting block and set the hull in a temporary cradle also detailed in Fig. 10. Its crosspieces fit the hull near stations III and 3. Two slim screws hold the hull and cradle together securely, passing into the keel where mounting pedestals are to be located later.

Deck Crowning

Use a rasp and coarse sandpaper on a block to crown the deck, stroking with the

grain and also inward from the edges, to penciled lines marked on the sides at points indicated in Fig. 11. In the original ship the real deck had a sharp downward incline near the sides and was here covered with a false deck which joined the real deck as shown in Fig. 12. Gratings between cannon drained water to the real deck below where it flowed out through holes (scuppers) in the sides. The planking of the real deck—the center portion—is straight, while that of the false deck is curved as shown in Fig. 14.

Before marking the deck to simulate planking, locate and mark the gratings. First pencil the axis lines of the guns lightly so that sanding will remove the lines. Locate the axis lines as follows: Stick masking tape on the deck at the centerline and then mark on the tape, the center-

TABLE OF DECK HEIGHTS																	
Station Lines	VII	VI	V	IV	III	II	I	M	1	2	3	4	5	6	7	8	9
Height of Main Deck at Centerline	$G + \frac{1}{32}$	$F + \frac{1}{32}$	$F + \frac{1}{32}$	$E + \frac{1}{16}$	$E + \frac{1}{32}$	$E + \frac{1}{32}$	$E + \frac{1}{16}$	$E + \frac{1}{32}$	$E + \frac{1}{32}$	$E + \frac{1}{16}$	$E + \frac{1}{32}$	$E + \frac{1}{32}$	$E + \frac{1}{16}$	F			
Height of Main Deck at Sides	$G + \frac{1}{32}$	$F + \frac{1}{16}$	$F - \frac{1}{32}$	$E + \frac{1}{16}$	E	$E - \frac{1}{32}$	$E - \frac{1}{16}$	$E - \frac{1}{32}$	$E - \frac{1}{32}$	$E - \frac{1}{16}$	E	$E + \frac{1}{32}$	$E + \frac{1}{16}$	F			
HEIGHT OF DECKS AND AMOUNT OF CROWN GIVEN IN RELATION TO LIFT AND STATION LINES (+ AND - MEANS ABOVE AND BELOW LIFT LINE MENTIONED)													Height of Poop Deck at Centerline		I	$I + \frac{1}{32}$	$I + \frac{1}{16}$
POOP DECK LATER PROVIDED WITH $\frac{1}{16}$ " THICK FLOOR WHICH EXTENDS OVER MAIN DECK TO STATION 4													Height of Poop Deck at Sides		$I - \frac{1}{16}$	$I + \frac{1}{32}$	$I + \frac{1}{32}$

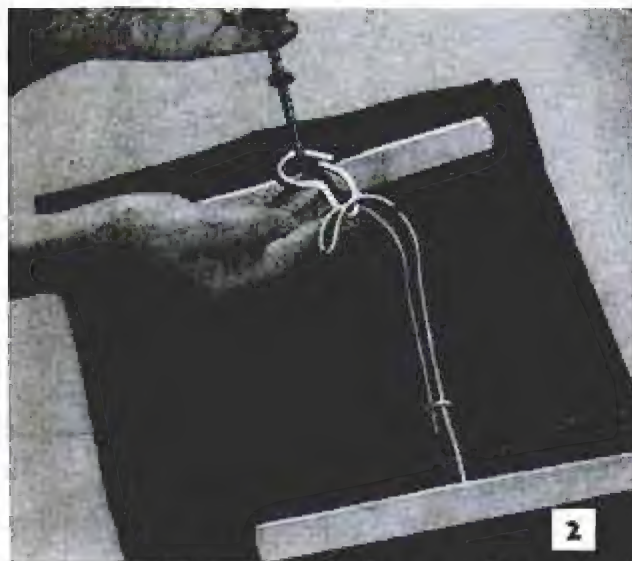
Solving HOME PROBLEMS



1

1. A WOBBLY TABLE fitted with casters often can be leveled with a thin washer. Remove the caster from the short leg and slip the washer over the caster shank. Then reinstall. In most cases, there is enough play in the caster socket to take the washer

2. SHORT OF HANGER SPACE? Make a few S-hooks of wire and use them to gang several trouser hangers together in the manner shown. Hooked around the hanger hook itself, the S-hooks permit two or more hangers to be hung in space normally occupied by one



2

3. STAMPS ARE AT HAND when you want them if they are kept in your stationery box. A handy pocket in which to keep them can be made by taping a small envelope in the corner of the box lid. A second envelope can be provided for gummed labels

4. KEEP A SCRUB MOP and a pail of water near by when burning leaves. You'll find a wet mop is more effective in snuffing out a small leaf fire that threatens a shrub or fence than by beating with a rug or blanket which often fans and spreads fire

5. STAND AN UMBRELLA in a closet and the chances are you'll find it on the floor the next time you need it. Where an umbrella cannot be hung, a neat nonskid pad for the metal tip is provided by cementing a rubber furniture-leg cup to the floor

6. A GOOD PLACE to keep a pair of scissors and tweezers so you know right where they are is on the back of the medicine-cabinet door. Neat holders for them are improvised by sticking a couple of adhesive bandages to the door to serve as pockets



3

7. COAT HOOKS convenient to an entrance are made more decorative and much less conspicuous if centered on cardboard cutouts, such as stars. Make the cutouts about 6 in. and paint both cutout and hook the same color or the star a contrasting color

8. GETTING THE WIRE over the nail when hanging a large picture is less of a problem if you make use of a notched stick. The photo shows a back view for clarity but in actual use you would face the picture and slide the stick upward against wall

9. WHEN DARNING A HOLE in the finger of a glove, you'll make a much neater patch if you mend it over a darning egg. Here a glass marble proves ideal as a miniature "darning egg" since it can be worked into the end of the finger to back up the hole

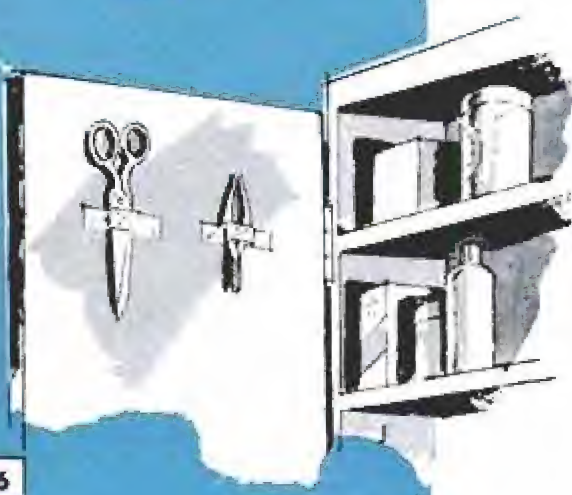
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5



6



7



8

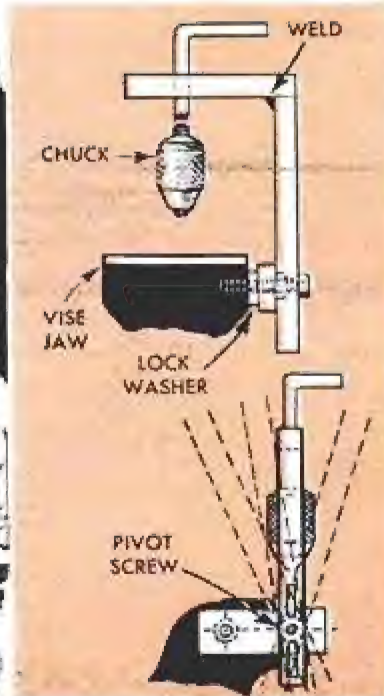


9





Hand Tapper Is Adjustable For Working at an Angle



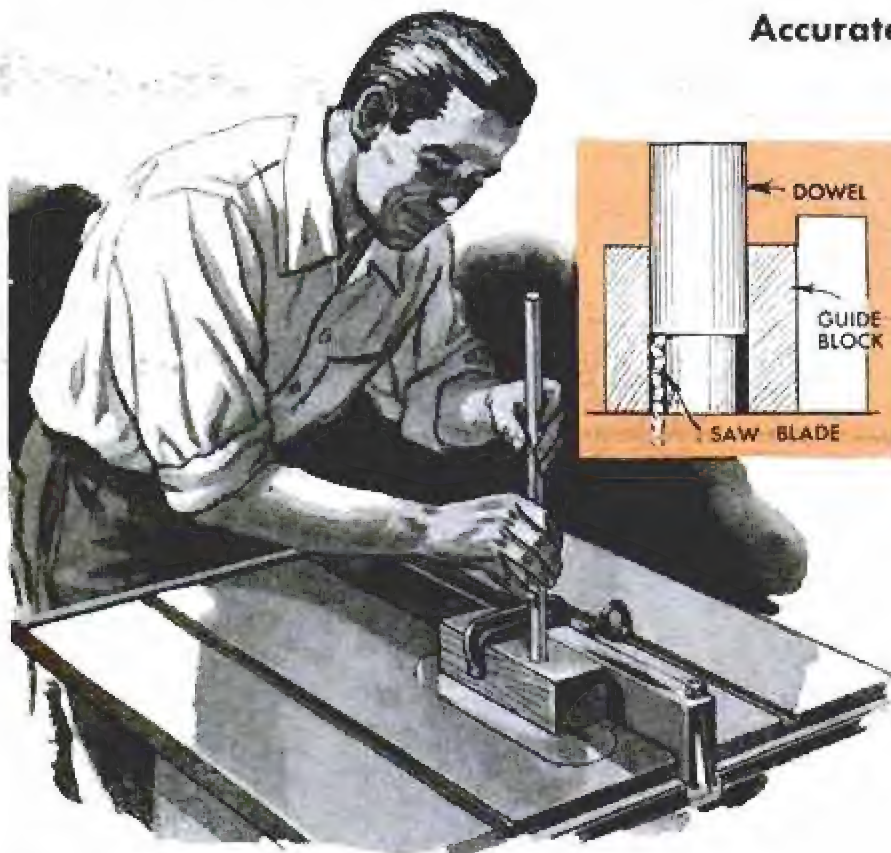
This is the type of tapping jig which is good to have around when one of those unusual threading problems comes up and the job must be done in a hurry without breaking the tap. In addition to ordinary straight tapping, this jig is especially good for starting a tap in holes drilled at an angle or on a sloping surface, as on a casting. The work is held in the vise and the overhead arm, which carries the chuck, is attached to the movable jaw with a capscrew and lock washer. The arm is slotted for vertical positioning.—R. Hill, Columbus, Ohio.

"Safe" Edge on Regular File

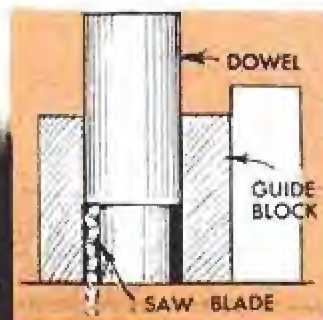
When it's necessary to work with a file against a finished shoulder you can prevent scoring and undercutting of the shoulder by placing a strip of masking tape along the edge of the file. The tape covers the cutting teeth on the edge of the file, permitting you to work into the corner.

Keeping Loose Caster in Place

Of course, you've picked up a chair at sometime or other and had the loose caster fall out. No use putting it back as it is; it will repeat the performance. With a hacksaw slot the top end of the caster spindle and spread the cut. Snap the caster back in place and it will stay put.



Accurate Tenons Cut on Dowels With This Simple Jig



Suppose you need, say, a dozen dowels of a given size and length with one or both ends tenoned. When you come to think about it, it doesn't look so easy — until you take time to make this novel jig. Then you can do the job in about three seconds per dowel, and factory-accurate, too. Drill a hole through a block of hardwood, the hole the same diameter as the dowels to be tenoned. Sand the hole lightly so that the dowel is an easy fit. Clamp the block to the ripping fence of the table saw. Start the saw and raise it to the correct depth. Then insert the dowel, press down and turn slowly.

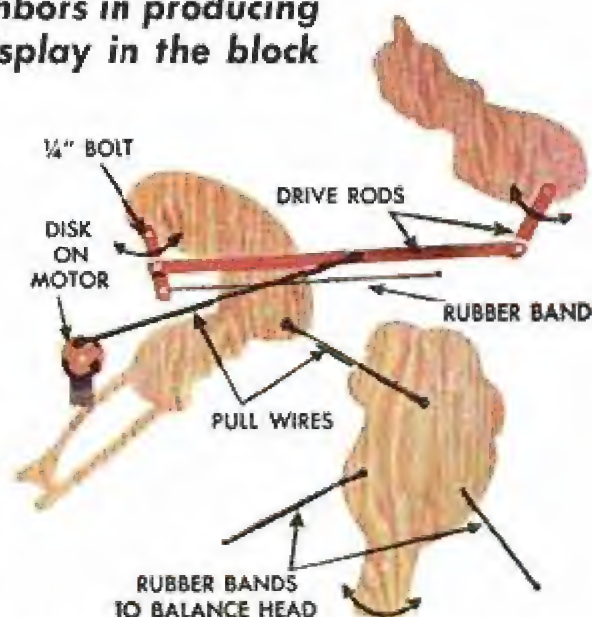
ANIMATED CHRISTMAS DISPLAYS



More and more homeowners are finding real competitive fun in trying to outdo their neighbors in producing the most talked about Christmas display in the block

CHRISTMAS REALLY COMES to life when you build animation into your outdoor displays. While many go all out to illuminate their homes and yards, some in a most elaborate manner, it's the animated display that gets the real attention and enthusiastic comment.

The three animated musicians shown above play and sing in a most lifelike manner. The bass fiddler saws back and forth, the mandolin player picks away at the strings and the caroler's head rocks from side to side, all to the accompaniment of a hidden record player. Fig. 1 shows how the head and arms are actuated and driven by an eccentric attached to a small motor mounted on the back of the plywood figures. This fairly simple mechanism can



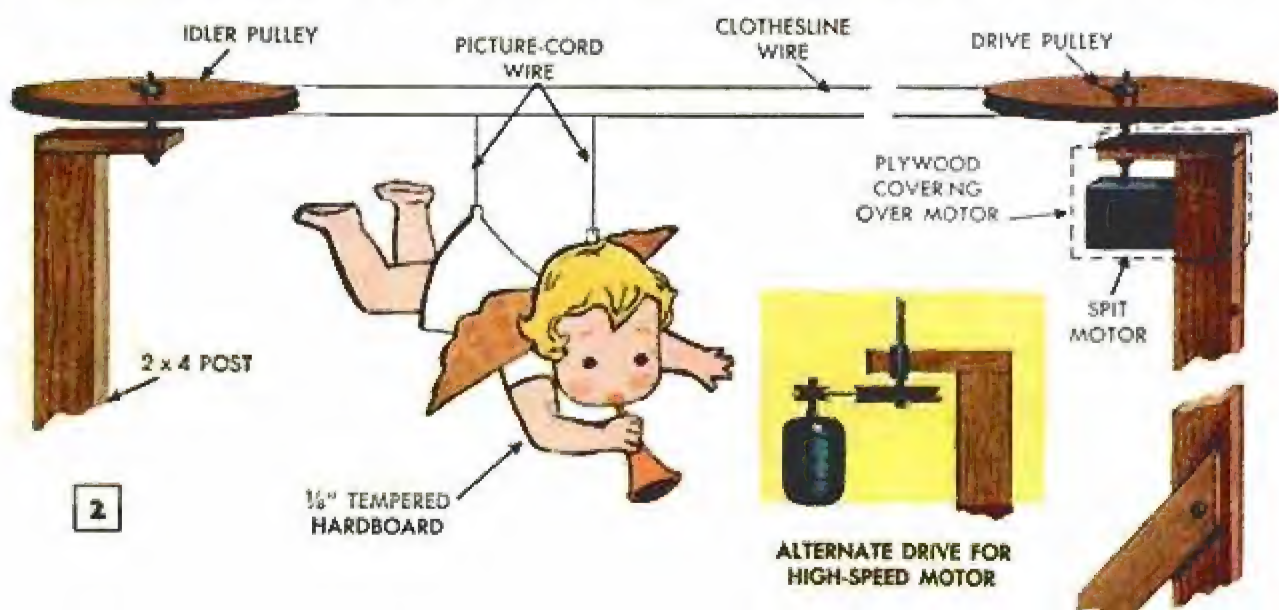
1 DRIVE SYSTEM FOR MUSICIANS



be adapted to a variety of Christmas scenes. Ordinary $\frac{1}{4}$ -in. stove bolts are ample for the axles of the moving parts, and strips of $\frac{1}{4}$ -in. plywood will serve as drive rods. You can shorten or lengthen the action of a moving part by just repositioning the bolt on its drive rod. A 4-in. wooden disk is attached to the motor and a wire looped around a screw in the disk pulls the main drive rod in one direction. A rubber band returns it when the wire slackens. The only critical point in this display is to secure the disk tightly to the motor shaft. This can be done with a pin through the shaft or by screwing the

disk to a small pulley which has a set-screw. The small caroler is nailed to a wooden block on the front of the display, about 3 in. out in front, so his moving head will have ample clearance. Only lighting required is a hidden floodlight in front.

The motor for most animated displays can be very small, but it does need to be one with a reduction gear, to have enough power and to run slowly enough. Fig. 4 shows two such motors that are often found around the home, one a spit motor from the barbecue grill and the other from Junior's toy construction set. Either is fully adequate for most needs.





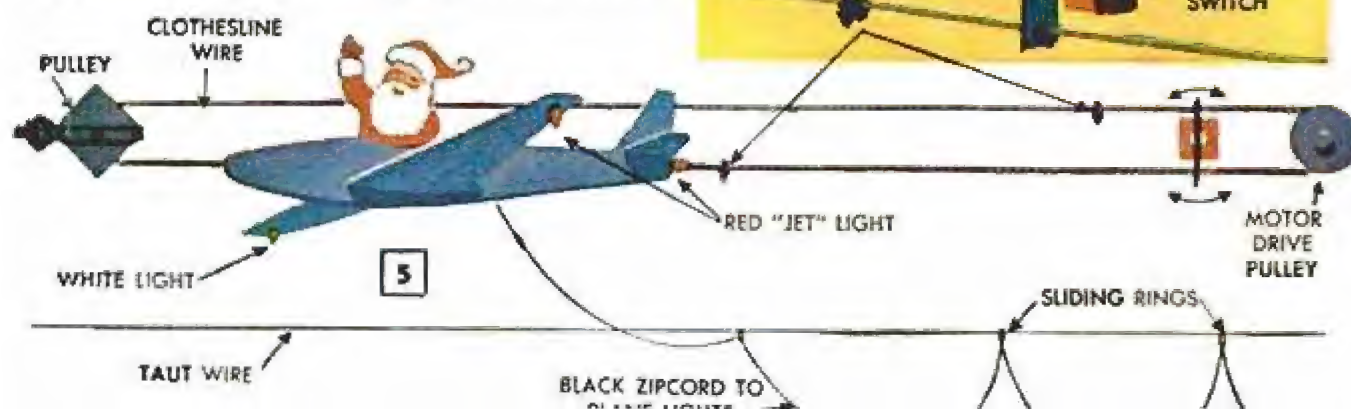
Santa speaks through hidden microphone and speaker. Peephole in nearby garage lets operator observe passersby to extend friendly personal greeting

Fig. 2 shows another simple way to obtain animation. At night, three choir boys sing Christmas carols via a hidden record player, while entranced cherubs fly back and forth overhead. The moving cherubs are attached to a long loop of clothesline wire, which travels around two large wheels mounted on short posts on the roof. Wheels from a child's wagon or the like, minus the tires, or similar ones of $\frac{3}{4}$ -in. plywood, turned and V-grooved on a lathe, will do. Their axles can be ordinary bolts, and a nut on each side will lock the drive wheel to its axle. As the drive of a barbecue spit motor turns at approximately 6 r.p.m., it will give the correct speed when attached direct to the drive axle. The braces for the two 2 x 4 posts are best fastened to the roof in a way they can be moved up or down slightly on the posts to tension the clothesline cable. The motor is boxed in with plywood sides, as shown, to gain rigidity and protection from the weather. Paint the posts and mechanisms black to be inconspicuous at night. The cherubs, "stained glass" church window on the roof and the choir boy assembly below, all are cut from $\frac{1}{4}$ -in. plywood. The window uses colored cellophane for the stained-glass effect and is lighted from behind. The choir boys and the cherubs are floodlighted from the front.

The display detailed in Fig. 5 is a challenge to any radio ham. Santa Claus first appears in a jet plane, flying over the roof.



Reduction-gear motors, such as these, are powerful enough to operate your display. One is from barbecue spit, the other taken from a toy construction set



wired into the system, Fig. 3, so Christmas music can be played when the operator tires of the game.

You will need a reversible motor for this type of display. The jet plane and parachute move on loops of clothesline wire, similar to the cherubs except that these are stopped and reversed by a switching arrangement rather than revolve around the pulleys. Depending on the equipment you have available, the timing and lighting of the three different scenes can be controlled by switches in the house or automatically by surplus radio or telephone timers and relays. The fireplace scene and the parachute descent are floodlighted from the front. The jet plane has wing lights and a red "jet" bulb in the rear, powered by a traveling cord.

Activity Galore

Figs. 6 and 7 show how complete an animated display can be. This scene depicts Santa's departure from the North Pole with his load of gifts. Santa waves goodbye while the reindeer prance, eager to start. Mrs. Claus waves a fond response. Three of Santa's helpers celebrate the occasion with a gay skating party behind the snowbank. Bright stars twinkle in the sky above and smoke even rises from the chimney of Santa's house. A concealed loudspeaker connected to a tape recorder inside the house tells Christmas stories to the droves of entranced kiddies (and adults) out front.

The simple drive that activates Mrs. Claus' arm is shown in Figs. 7 and 8. A similar drive on another small motor waves Santa's arm. A drive rod from Santa's motor also animates the reindeer legs as shown in Fig. 6. The three skaters have a different type of action. They roll by gravity on three seesawing tracks, Fig. 7. The tracks can be 10 to 20 ft. long, pivoted at the middle, and can be activated several ways. A small display motor can power each track, or three small surplus reversing-type hydraulic pistons powered by a small pump via a garden hose, can be used to push the tracks up and down. Or one motor or one piston can power the middle track and also the outer two, best done by using a reversing-bar arrangement as shown, so some tracks will be moving up while the other is moving down. If three motors are used, vary the diameter of their drive disks slightly since the skaters will appear more natural if not moving at the same speed and same timing.

How Skaters Work

The skaters roll on pairs of pulley wheels, obtainable from aircraft surplus. A large bolt or other weight counter-



Back view of Mrs. Santa Claus shows how drive rod attached to motor-driven eccentric provides a gently waving movement to arm holding handkerchief

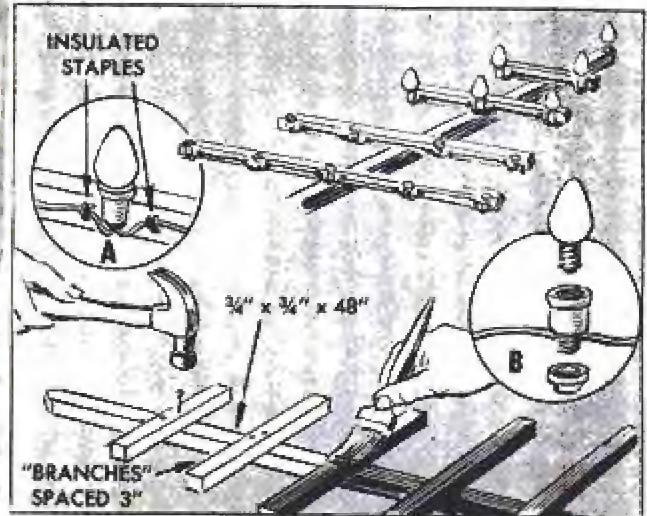
balances each figure from below. To prevent too rapid a motion by the skaters, each is slowed down by bolting a fan brake to one of its pulley wheels. The pulleys roll on the edge of a metal strap in the track, detail B, Fig. 7, and the ends of the track are curved upward to slow the skaters.

Plywood or Hardboard

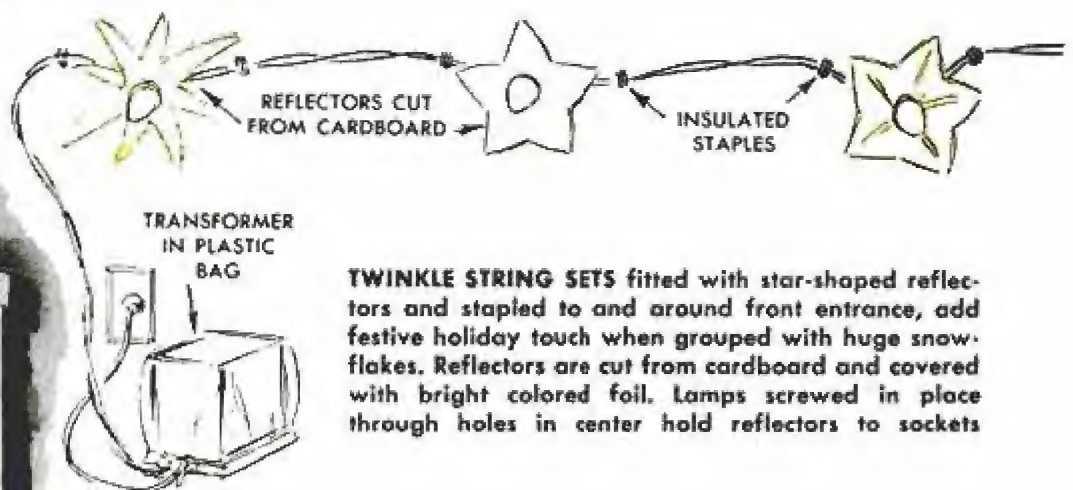
All the figures and Santa's house are cut on a jigsaw or bandsaw from 1/4-in. plywood or hardboard. The snowbank conceals the tracks and other machinery of the skaters and is formed of chicken wire over a lath-and-lumber framework. The snow is several layers of newspaper, dipped in plaster of paris of the consistency of cream, laid over the wire and, when dry, finished with a coat of flat-white primer which is sprinkled with mica snow while still tacky.

The North Pole in the scene is a 2x4 driven into the ground and covered with stovepipe after which it is striped with paint, using masking tape for a guide. The stars above the reindeer are a string of the new twinkle-type 6-v. tree bulbs strung on fine black wire. The lead deer is Rudolph, of course, and has a red bulb mounted in his nose. The smoking chimney operates by simply concealing a bottle of imitation smoke (titanium tetrachloride) on the back side of the chimney with a bit of rag as a wick in the bottle ★ ★ ★

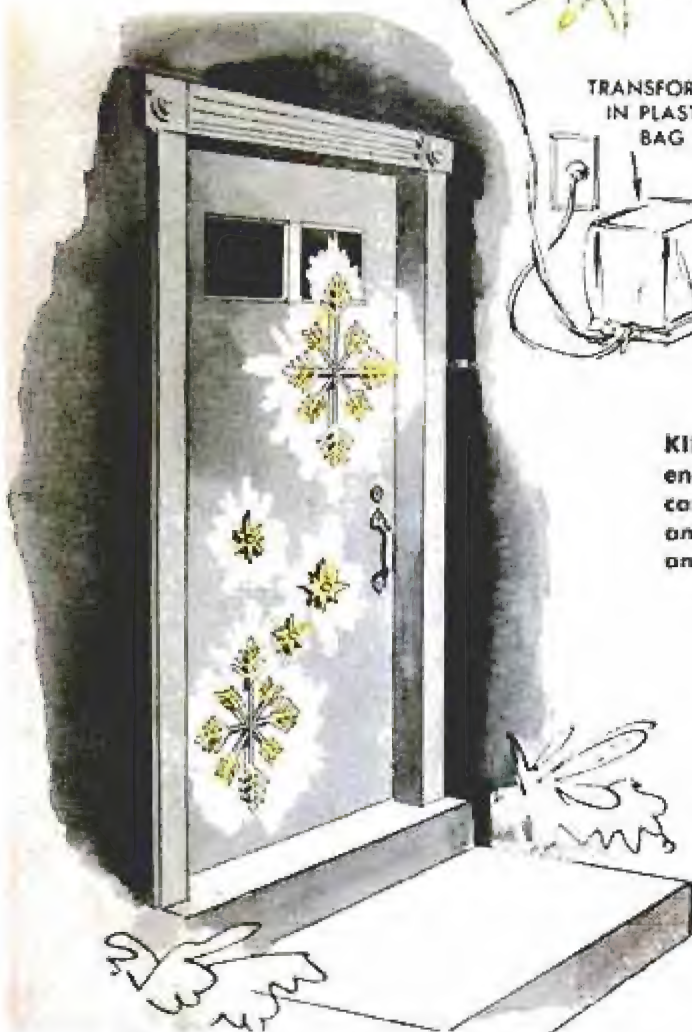
DECORATING IDEAS



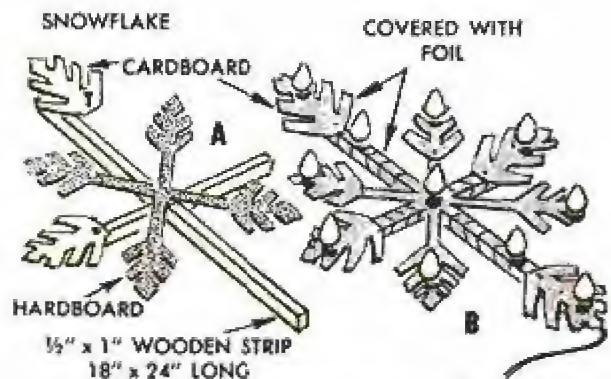
TREE STRING SETS or "add-on" sockets, stapled and taped to branches of wooden Christmas trees, make striking effect when grouped on door and facade of house. Lamps per branch vary from two to six from top to bottom. Floodlighting fills in background



TWINKLE STRING SETS fitted with star-shaped reflectors and stapled to and around front entrance, add festive holiday touch when grouped with huge snowflakes. Reflectors are cut from cardboard and covered with bright colored foil. Lamps screwed in place through holes in center hold reflectors to sockets



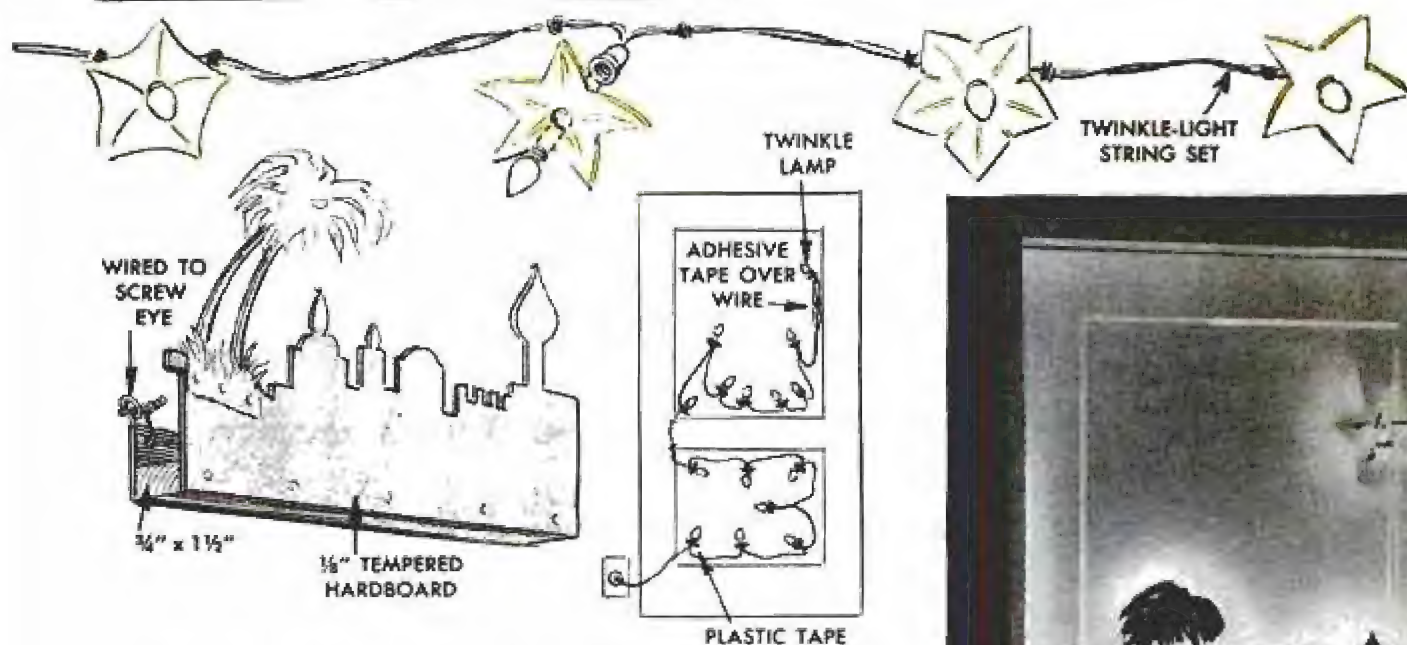
KING-SIZE SNOWFLAKES are made by half-lapping two wooden sticks and tacking snowflake patterns of hardboard and cardboard to the top. Lamps are taped to sticks to stand upright and then the whole affair is covered with aluminum foil. Wire and screw eyes are used to mount snowflakes on the front door



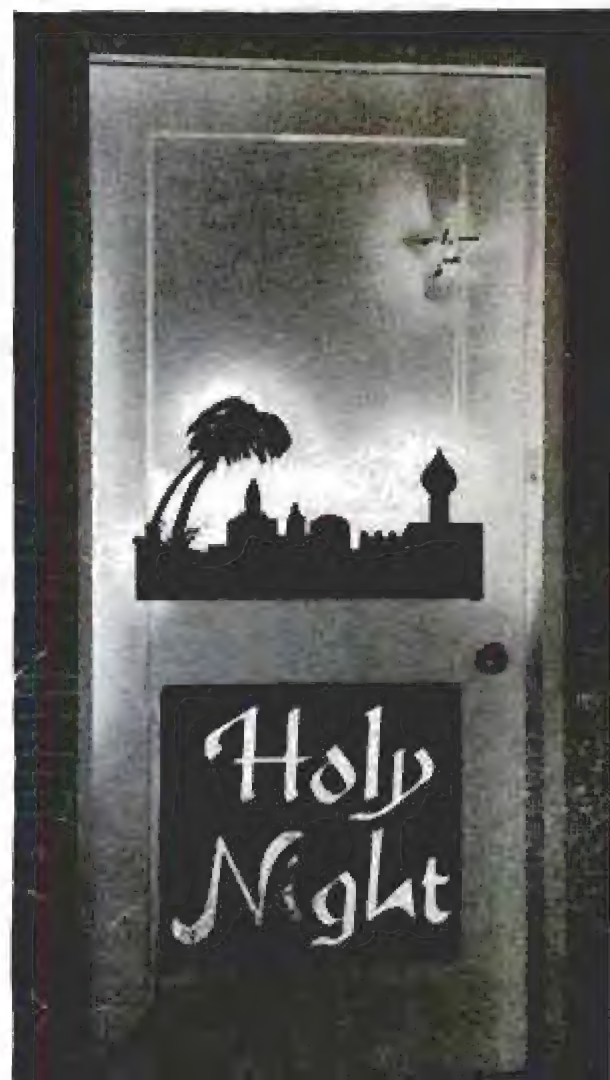
POPULAR MECHANICS

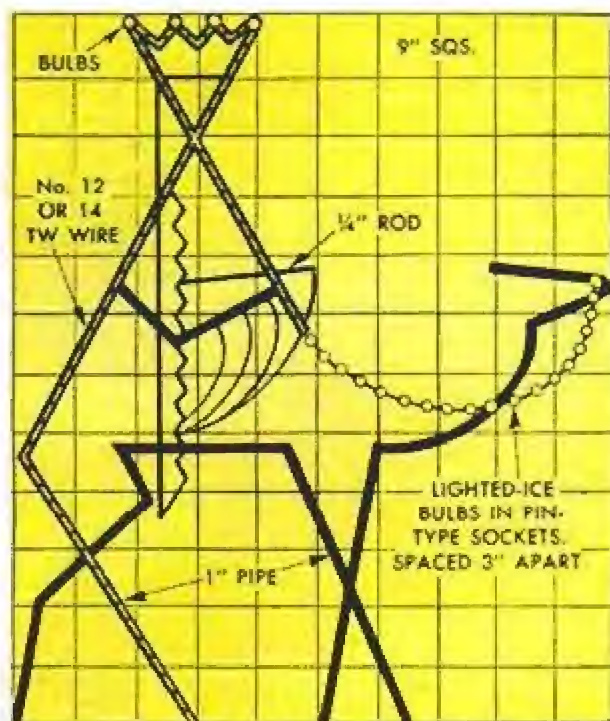
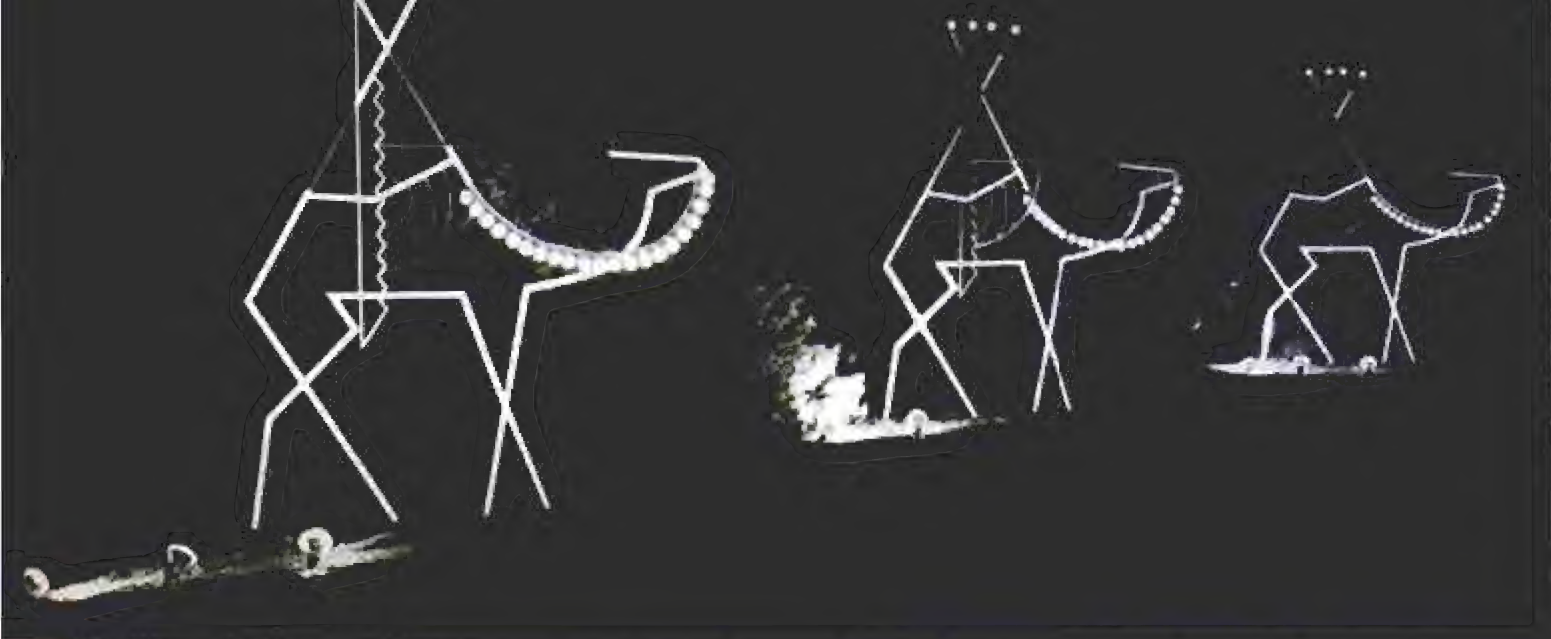


Colored silhouette of tree against white house is obtained by placing plywood cutout between two 150-watt floodlamps. Bore holes in tree for sockets of string lights and support tree in slotted stakes 3½ ft. from wall. Use color roundel on hidden lamp



AMONG THESE decorating ideas from General Electric's booklet *New Ways To Say Merry Christmas*, are lighted silhouettes which can be worked up into a most appropriate door display. A good example of this is shown in the photo at the right. Here, the Holy City skyline is jigsawed from hardboard, painted white on the back and black on the front and fastened to a supporting cleat. A 15-lamp string of tree lights is taped to the upper and lower door panels in the position indicated, with a twinkle light being used in the end socket to light the star of Bethlehem. The skyline cutout is hung in front of the upper lights and a Holy Night cutout, set out by a frame, is mounted in front of the lower lights. Bulbs of one color can be used to light the skyline





silhouette, another color for the rest. A floodlamp placed 15 ft. away provides over all illumination.

The story of the three wise men is cleverly depicted by figures made principally from 1-in. pipe. Wire leading to the lighted crowns and the camel's reins is brought up inside the pipe framework. Painted white and provided with colored bulbs, the effect is spectacular when floodlighted from the front. The drawing at the left shows how the pipe members are laid out and tack-welded to form the figures.

Another clever display is illustrated below. A neighborhood project and feasible where homes in the block are of the same height. Santa and his eight reindeer, in cutout form, are placed to extend across the roofs of three houses and floodlighted. Connecting reins are formed with a string of pin-on sockets fitted with the new lighted-ice bulbs. The effect is quite startling when viewed from the street. ★ ★ ★



Household Cement Repairs Damaged Spots in Pile Fabrics



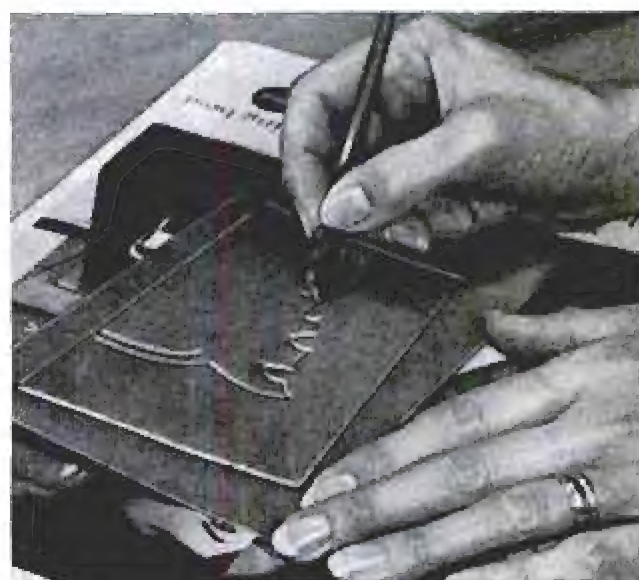
"Bald" spots in long-nap or pile fabrics, of the type used for carpets or coats, can be filled in and made unnoticeable for all practical purposes with the aid of a good grade of household cement, such as Pliobond. The photos show a carpet with a "sculptured" pattern being repaired by this glue method. First, enough tufts of the material are pulled or cut from a scrap piece, or near the edge of the damaged item where it will not matter, to fill the bald area completely. Next, a "prime coat" of the cement is spread on the damaged spot in the material and allowed to dry thoroughly. Now each tuft of the material that has been put aside is picked up with

tweezers and the lower end dipped in cement so that each strand is completely saturated. The tuft then is fitted in position on the dried cement. Additional tufts are cemented in place until the damaged area is filled. When the cement on the tufts has been given plenty of time to set, the upper ends of the tufts, which now should appear as a solid surface, are trimmed to match the height of the adjoining material. For this latter operation a pair of electric hair-cutting clippers would be ideal. A comb could be used to control the cutting height of the clippers, much the same as when they are used for cutting hair. Coarse-cutting clippers would be best.

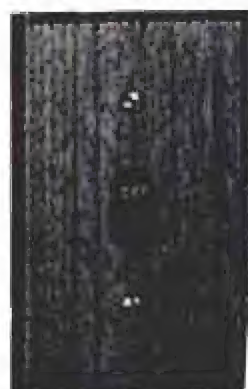
Glass Cutter Used as Tracing Tool for Copperwork

Ideal for tracing or deepening lines in such handicraft work as sheet copper bas-reliefs, is a discarded glass cutter. The worn wheel of the cutter will not scratch or gouge the metal, as do the usual tracing tools, such as metal scribes or pointed dowels. A pattern can be traced directly by placing the paper over a sheet of metal and running the glass cutter along the lines. Cement the paper so it does not slip.

R. J. DeCristoforo, Los Altos, Calif.



Brass Switch Plates Renewed With Sheet-Plastic Material



Old-fashioned brass switch plates that have become tarnished and unattractive can be given like-new appearance by covering them with one of the new sheet-plastic materials that are backed with contact adhesive for easy application.—O. A. Nelson, Seattle, Wash.

Paint Roller Stored in Milk Carton

After a paint roller has been cleaned and dried, it should be stored so that it remains dustfree and clean. Waxed milk cartons are ideal for this, a quart size being just large enough to accommodate a regular-size roller.—R. M. Woodbury, Natick, Mass.



GLAMORIZE

**YOUR CHRISTMAS
CANDLES**



YOU CAN GLAMORIZE your everyday candles and decorate special Christmas ones to produce elaborate and colorful centerpieces and other displays, using only a pair of shears, stickpins, sequins and used gift-wrapping material as illustrated. In addition, cutouts from Christmas cards, birthday and Valentine cards, paper place mats and doilies may be attached to candles in a variety of ways. When large-size candles and special shapes are not available locally, they can be made from candle leftovers melted down and poured into paper cartons and other containers, such as was done to produce the large, square-cross-sectioned ones shown on the opposite page. Heavy cotton cord was used as wicking for the latter. Also, candlemaking materials can be obtained from some hobby and craft shops, should you decide to make all of your Christmas candles.

Decorating ready-made candles is easy as shown in the photos at right. After selecting a ribbon of the desired color and width, wrap it around the candle in a spiral as in the two photos at the bottom right of this page. To keep the ribbon in place press a stickpin into each turn, impaling a star-shaped sequin on each pin for added color. The upper end of the ribbon is covered by a sunburst cut from gold-tinted foil. The candle then is positioned on a base by melting a few drops of wax around the bottom of it. To conceal the base, a few colored beads and fir-tree limbs and cones are arranged on top of it. ★ ★ ★

Below, metallic sunburst framed by white paper-doily cutout fastened to dark green candle make regal appearing centerpiece. Candle is held upright by nail driven into it from wood scrap that is completely concealed by covering of fir-tree branches and cones



NOVEMBER 1958



Above, sunburst cut from aluminum foil is pinned on candle near top to conceal end of metallic ribbon



Above, metallic ribbon wound in spiral on candle provides easy means of dressing up plain white candle. Below, sequins are attached to candle with bead-headed pins that also hold ribbon in place



Bicycle Horn Warns Customers of Service-Cart Approach



Shoppers in one small department store are warned of the approach of a service cart by means of a bicycle horn attached to the cart as shown. Alerted in this novel manner, customers willingly step aside to allow the cart to pass, permitting the stock boy to make quick deliveries of merchandise to various departments without colliding with shoppers.

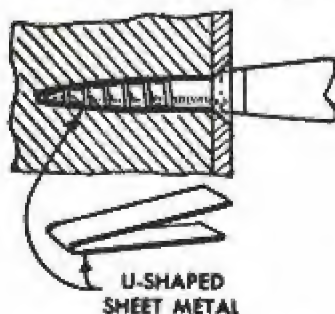
Arthur Tanner, Jr., Poughkeepsie, N. Y.

Ignition Key Concealed on Car Kept Clean by Foil Wrapping

An extra ignition key for emergency use is concealed on the car of one motorist by wrapping the key in aluminum foil and then cementing it to the underside of the hood. To further conceal the foil-wrapped key, it is coated with an opaque adhesive. When needed, the key is pried loose easily with a nail file or other metal object and unwrapped.

Henry Zave, Grand Rapids, Mich.

Metal Strip Secures Screw In Oversize Hole



When a screw hole becomes enlarged from the screw constantly working loose, and a larger screw cannot be used, try driving a U-shaped strip of sheet metal in the hole with a center

punch. The metal strip serves as a bushing when the screw is turned into it as shown in the detail. Use lightweight metal for this purpose, such as from a coffee can, and drive the strip completely into the hole.

Frederick H. Durkee, Williamsport, Pa.

Extension on Cement Tube Reaches Difficult Places

To permit applying cement in places that are hard to reach, one hobbyist added this extension to the tube spout. It consists of a small-diameter copper tube that is threaded at one end so it can be screwed into the tube spout which is tapped to take the copper tube. A small wood screw is turned into the open end of the extension to prevent the cement from hardening.



Christmas-Tree Ornaments From Used Flash Bulbs

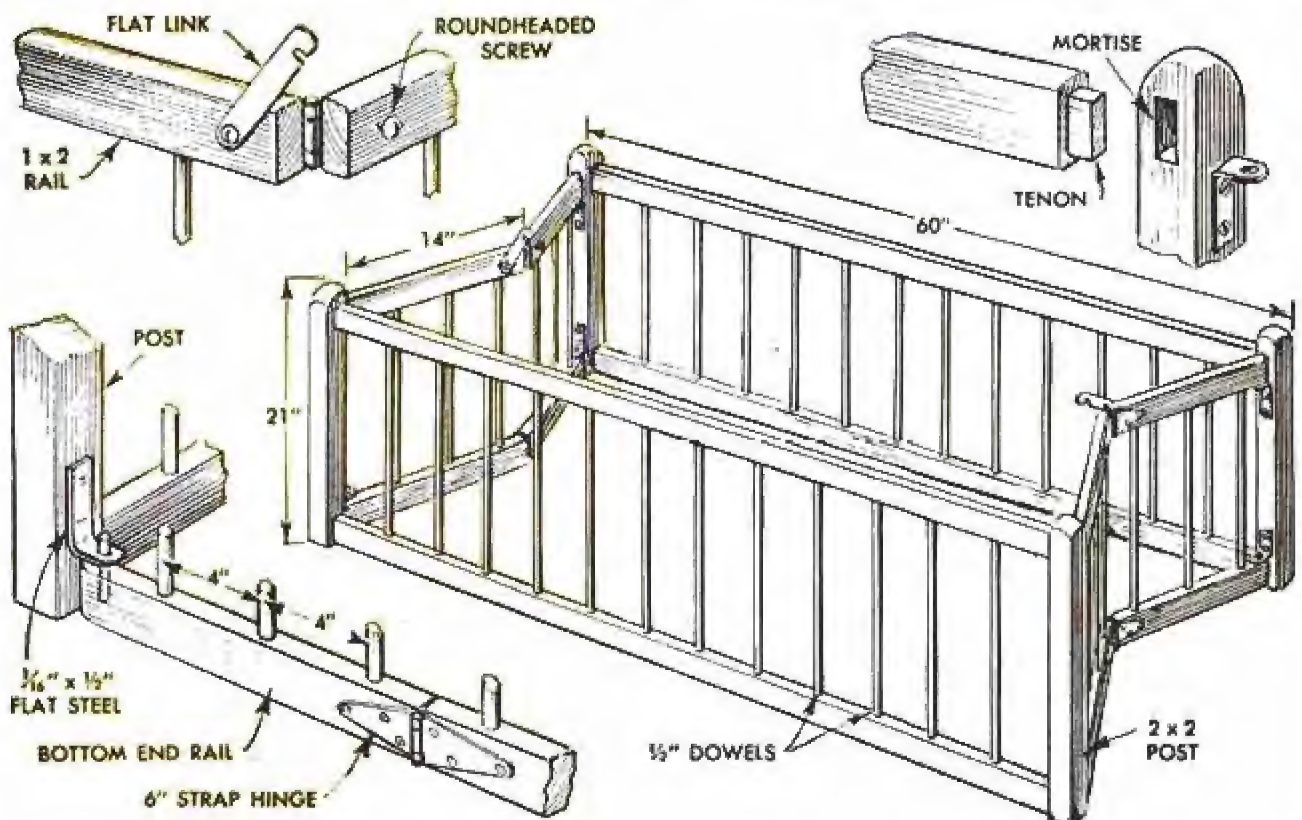
Here is a way of converting used flash bulbs into colorful Christmas-tree ornaments. First sand the blisters smooth, then spray the bulbs with one or more colors of the type paint sold in pressurized cans, dusting the ornaments with glitter before the paint dries. Use fine wire to hang the bulbs—Bil Toman, Palatine, Ill.

⚡ Better light radiation will be obtained from luminous paint that is to be applied over an old painted surface if you first apply a base coat of white lead to the area.

"Traveling" Crib and Playpen

By V. H. Laager

IF YOU HESITATE to travel by car with a toddler because the homes and motels you visit might not have safe sleeping accommodations for him, this portable crib-sides unit is the answer to your problem. The crib sides convert any bed to a crib in a matter of moments, and also can be placed on the floor and used as a playpen. The top and bottom rails of the unit are 1 x 2 stock, the corner posts are 2 x 2s. Standard $\frac{1}{2}$ x 36-in. dowels are cut in half to provide the vertical rods that are fitted in blind holes bored in the top and bottom rails. Position the rods on the shorter sides of the unit so none are located at the center where they would interfere with the strap hinges. Flat steel brackets on the corner posts allow the short sides to fold flat inside the longer ones when the "locking" links are released. The upper ends of the corner posts are rounded, as are the upper edges of the top rails. Four cotton-web straps are used, on the ends of which are sewed or riveted swivel snaps. The snaps are hooked into the bedsprings or frame, then the buckles are adjusted until the straps hold crib sides firmly.



SLAVE ANODE

By James Joseph



1 Above, magnesium anode is packed in quick-wetting backfill that is buried with anode to retain ground moisture, assuring constant flow of electrical current



2 Above, lead wire from magnesium anode is soldered to cleaned surface on sprinkler pipe. Figs. 3 and 4, after backfill is poured around anode, it is saturated with water and completely covered with soil



HERE IS HOW you can minimize corrosion in your hot-water heating and underground sprinkling systems. Simply attach a sacrificial magnesium anode to the system to divert the attack of the corrosion-producing electrical current from the steel tank or pipeline to the magnesium; as illustrated in this article. Copper tanks and pipes usually are not affected to any extent by such electrochemical reaction, called galvanic action. The latter can occur only when dissimilar metals are in direct contact with one another in a slightly acid solution (electrolyte, a situation that is quite the same in a dry-cell battery, Fig. 8. Usually the softer metals that are alloyed with the iron in a tank or pipeline (copper in this case) serve as the cathode part of the electric cell and the iron functions as the anode. The water that comes in contact with them normally contains sufficient impurities to act as an electrolyte, making it possible for electrical current to travel from the anode to the cathode through the medium of the electrolyte. In an unprotected hot-water tank or pipeline this results in loss of the steel metal which appears as rust.

Glass-lined tanks are protected from galvanic action, provided the steel surface remains completely covered throughout their use. To guard against the possibility of voids in the lining material, most heater manufacturers insert a magnesium anode in their tanks as detailed in Fig. 6. Since magnesium acts as an anode when associated with steel, the flow of current is reversed to "eat away" the magnesium anode, instead of tank surfaces that may be ex-

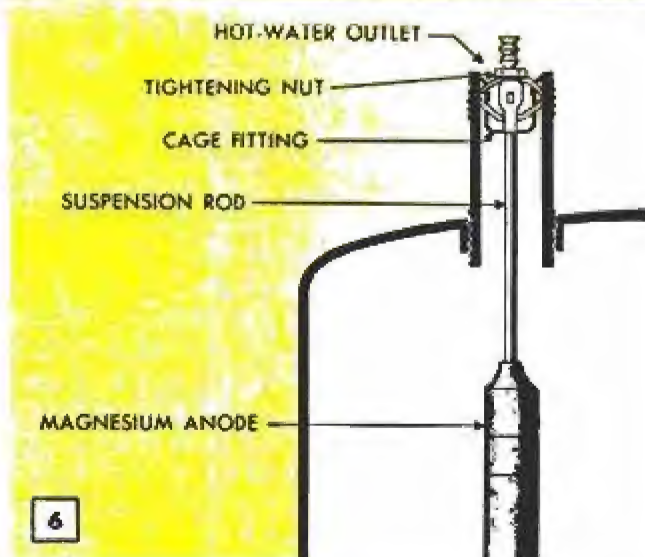


ARRESTS CORROSION

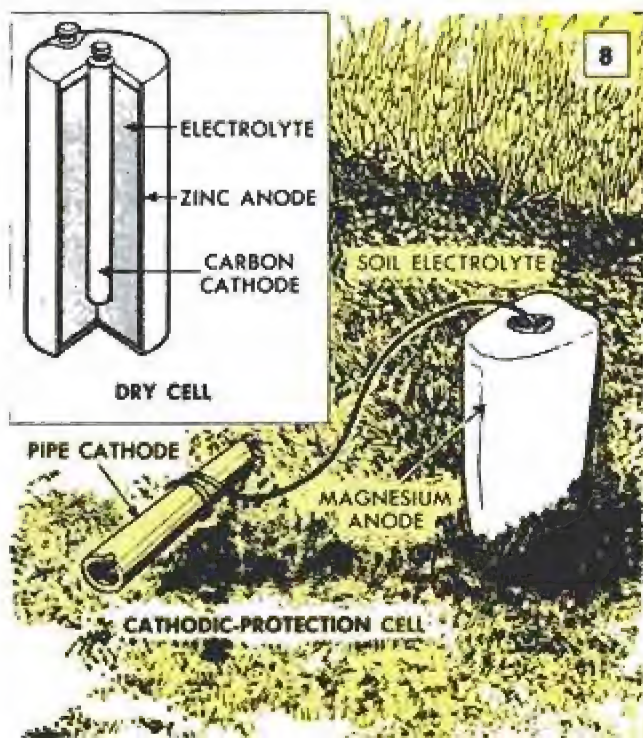


posed. Such an anode should last from two to six years, depending upon the amount of electrochemical action in the tank. Then it can be replaced at nominal cost.

If you have an unlined steel tank, it can be protected from rust by installing a magnesium anode in it as shown. Such anodes may be purchased at most large plumbing-supply stores. Easily installed anodes are of two types: Rigid, for locations where there is 4 ft. or more of clearance above the tank; flexible ones for tanks that have less than 4 ft. of overhead clearance. Also, anodes come in various sizes according to the tank's capacity in gallons. Whether rigid or flexible, an anode is a $\frac{3}{4}$ -in.-dia. rod of magnesium cored with a $\frac{3}{32}$ -in. plated-steel wire and equipped with a suspension rod and cage fitting for installing



Figs. 5 and 6, when there is limited clearance above hot-water tank, flexible magnesium anode is used



the unit in the nipple of the hot-water outlet at the top of a tank.

When installing an anode: First shut off the water supply to the heater and partially drain the tank. Then disconnect the union at the upper end of the nipple, remove the latter and push the hot-water pipe aside to clear the tank opening. Next, lower the anode into the tank, until the cage fitting is flush with the top of the nipple when pressed into the latter, Figs. 5, 6 and 7. Secure the tightening nut on the cage fitting and reconnect the hot-water line to complete the installation. To assure continued protection, the anode should be removed for inspection each year following the second year of the installation. When the magnesium is "worn" nearly to the core metal, it is time to replace the anode.

To provide similar protection for your underground sprinkling system, connect a magnesium anode of the proper size to one of the pipes. Anodes used for this purpose

usually are packaged with a quick-wetting backfill as shown in Fig. 1. When digging a hole for burial of the anode, select a section of the pipe that lies in a moist area, preferably where the sprinkler keeps the ground quite wet. Then expose about 1 ft. of the pipe and scrape bare a few inches of the galvanized coating. Next a hole is dug adjacent to the pipe so that 6 to 8 in. of soil will cover the anode when it is in place. After the lead wire protruding from the top of the anode is soldered to the pipe, the backfill is poured around the anode, Figs. 2 and 3. Then the backfill is thoroughly saturated with water, Fig. 4, and the anode and pipe are covered with soil. Some anodes have a terminal at the top in place of a lead wire, in which case an insulated TW-12 (copper) wire should be brazed to the pipe and the other end fastened to the terminal. Anodes for protecting sprinkling systems against rust may be purchased from companies that sell the systems. ★ ★ ★

Hardboard Template is Handy Drawing Aid

For a handy template for laying out and drawing squares, rectangles, triangles, circles and other geometrical shapes, use a small rectangle of perforated hardboard as shown in the photo. The $\frac{3}{16}$ -in. holes spaced 1 in. on centers are used as guides when spotting and drawing corners and lines. An outer edge can be used as a straightedge. Use a ball-point pen or a pencil with a tip that fits the holes snugly to assure that the point will be at the center of the hole when the pencil is held perpendicular to the template. To draw an arc or circle, one template hole is pivoted around a scribe or other fixed point and the pencil is inserted in another hole located to provide the desired radius. Use two pencils to draw sets of parallel lines.

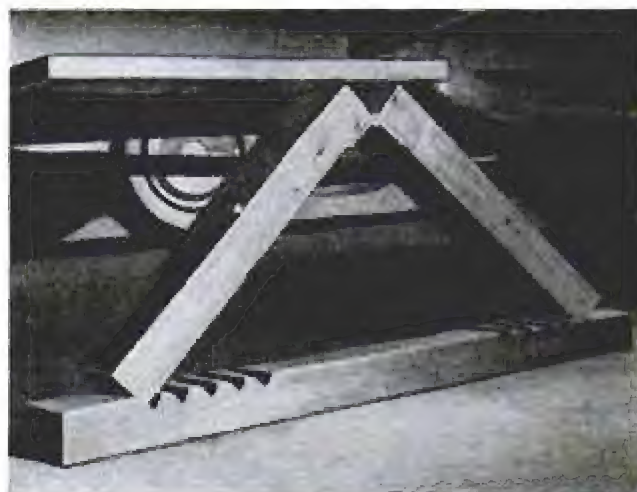
Walter E. Burton, Akron, Ohio.



Practical Supports Act To Level House Trailer

For a practical means of providing firm support for a house trailer when parking it for overnight or week-end stops, one trailer traveler devised the stabilizing supports shown in the photo below. Four are used, one for each corner of the trailer. Each support is made of a 2 x 4 base member with a group of five notches cut in one side near each end to take the legs of two shorter lengths of 2 x 4s joined together by a heavy hinge. In use, the trailer is unhitched and cranked to a level position. Then the front is lowered slightly to raise the back and the two rear supports are positioned under the trailer. Next the front is cranked slightly above level, the remaining supports are placed under it and the trailer is let down.

W. R. Palmer, Washington, D.C.



METAL TREAD for THRESHOLD

By E. W. Kraft

If the threshold on the entrance doorway of your house is badly worn, here is an easy way of effecting a permanent repair, provided the remaining wood is in good condition. Simply cut and bend a tread from 16-gauge sheet aluminum or steel to fit over the threshold and screw it into position as in the illustration at right. Sheet metal with a raised pattern on it should be used for this purpose, such as the material



used for making the tread shown in the photo. The first step is to make a full-size pattern of the tread, carefully measuring and cutting it to fit flush with the sides of the doorway and allowing enough material to cover the exposed edge of the threshold. After cutting the tread to size from the sheet metal, drill holes along each side to take No. 6 panhead sheet-metal screws as indicated. Then to permit bending the flange along a straight line, screw the tread cutout to two lengths of scrap lumber but-



ted together at the point the bend is to occur, to serve as backing pieces. A 45-degree bevel must be cut on facing edges of the backing pieces so that a right angle of small radius can be bent in the tread, resulting in a miter joint formed by the backing pieces. One of the latter is clamped in a vise when doing this. Next, remove the backing pieces and screw the tread to threshold. If steel sheet metal is used, completed tread should be coated with a rust-preventive primer and painted.

Cellophane-Lined Cardboard Box is Temporary Developing Tray

When an extra-large developing tray is needed, as when enlarging photos for exhibition, line the lid of a cardboard box of the required size with a sheet of cellophane or other cellulose wrapping material. To keep the cellophane in place, tape the edges to the box at the corners as shown in the photo at right.

☛To prevent accidental upsetting of a paper cup used as a glue pot, thumbtack it to a piece of wood scrap. The latter also permits moving the glue container without touching it with the hands.

G. E. Hendrickson, Argyle, Wis.





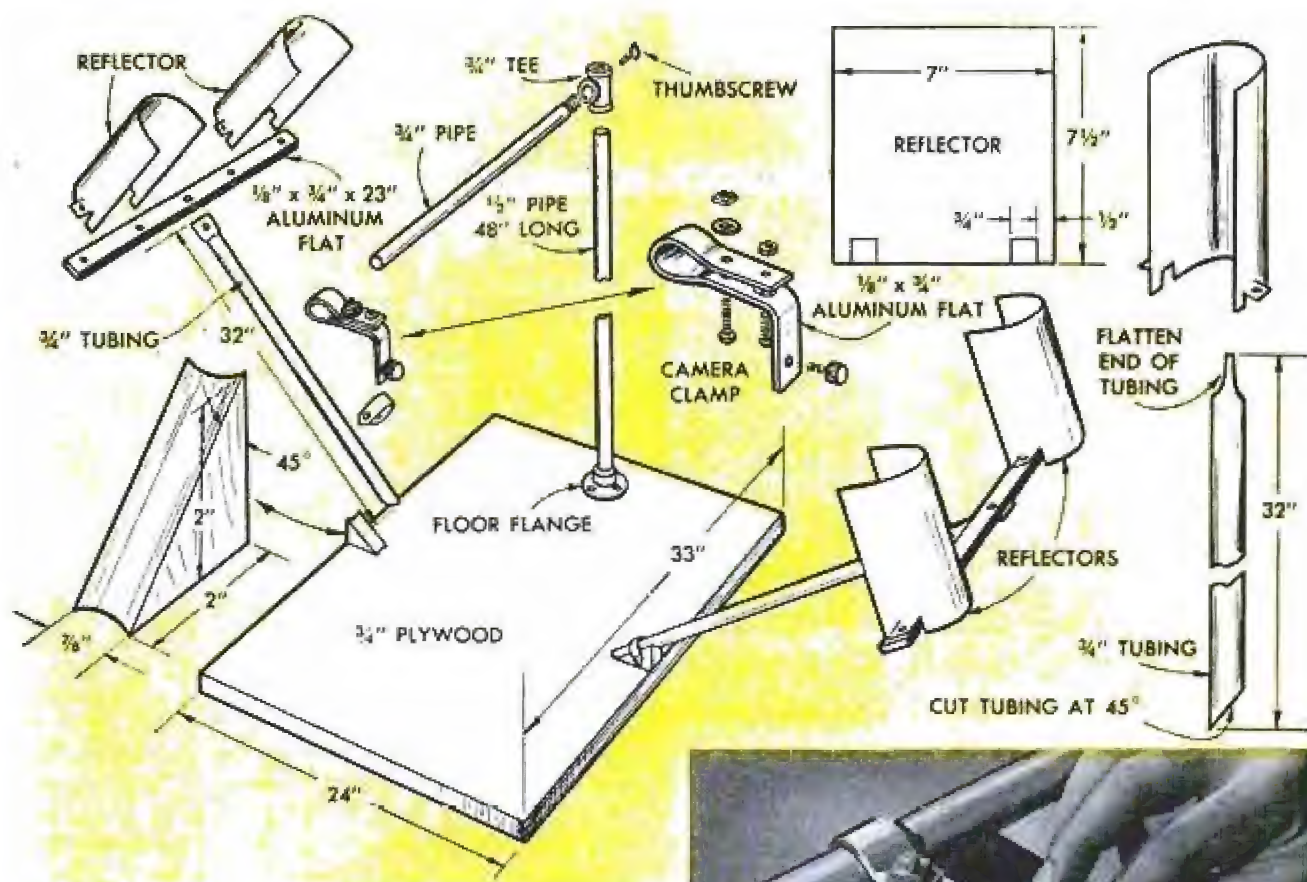
Hobbyist Microfilms His Records to Save

IF YOU ARE a hobbyist whose main handicap is lack of space, microfilming might be the ideal solution to your problem. Collections of magazine articles, data sheets, plans and blueprints can be reduced to a few rolls of space-saving film. As an example, 7 ft. of microfilm can contain 56 maps, plans and the like, the minimum original dimensions of which were 30 x 40 in. each. Should one of your hobbies be photography, your 35-mm. camera and some microfilm will provide the basic unit for a microfilming setup that itself occupies a minimum of space. Any photo enlarger is used for reading the film.

The base of the microfilming unit is a 24 x 33-in. sheet of $\frac{3}{4}$ -in. plywood. Close to the edge, at the center of one of the 24-in.-sides, screw a $\frac{1}{2}$ -in.-pipe floor flange. Into this flange screw a 48-in. length of pipe threaded on one end. This is the vertical column for the camera arm. Over the column slide a $\frac{3}{4}$ -in. pipe tee that has been reamed for a sliding fit. The tee then is drilled and tapped to accept a $\frac{1}{4}$ -20 thumb-screw that locks the tee in place on the column. Into the tee is screwed a length of pipe that forms the support arm for the camera itself. The length of the arm can vary, but should allow the camera to be positioned above the center of the base.

At the center of each edge of the base,

as shown in the detail, is located a triangular-shaped hardwood block. The diagonal edge of each block is hollowed to accommodate the circumference of a length of $\frac{3}{4}$ -in. tubing. Each of the blocks is attached with glue and two wood screws driven through from the underside of the base. The tubing clamps on the blocks should hold just firmly enough so the tubing can be pulled out easily when the unit is disassembled for storage. The lengths of tubing, which are light standards, are 32 in. long on the original unit, but could be shorter to position the lights closer to the work. Each length of tubing has the lower end cut off at a 45-deg. angle and the upper end flattened and drilled. The upper ends are bolted to flats on which are fastened two light sockets and reflectors. The latter are cut and shaped from light sheet aluminum. Ordinary 100-watt lamps are used, as they last longer than photofloods. The lamp sockets are wired in parallel and fitted with a single switch. Microfilming is done with the camera shutter open, in the dark, or in dim light. The four lights then are turned on by means of the switch for the required number of seconds of exposure. This method eliminates the chance of moving the camera when snapping the shutter. A supplementary close-up lens must be used on a camera when it is used



Storage Space By Tracy Diers

for microfilming, and even a slight movement of the camera during the exposure time could cause a blur. Clamping devices for the camera are available at camera-supply stores, or one can be made from aluminum flat as indicated. In either case, the camera must be clamped firmly to the support arm.

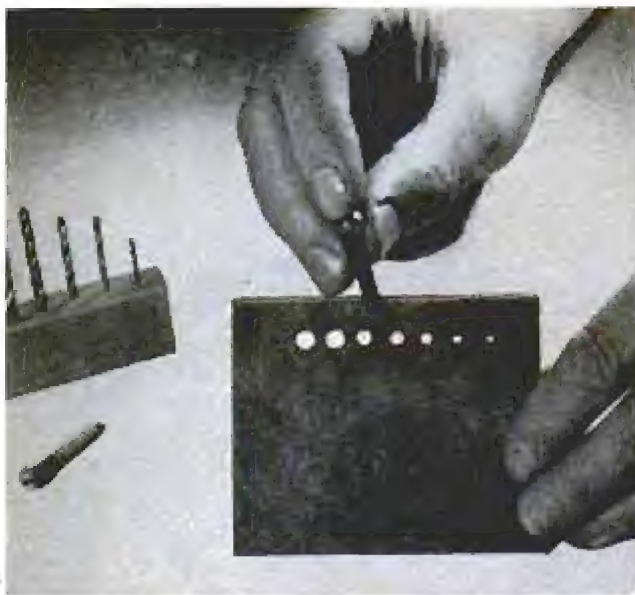
To simplify and speed the work, it is helpful to mark a series of lines on the plywood base to indicate standard areas that the camera will cover at a particular height. A file mark also is made on the column to show the corresponding height of the camera arm for a particular area. To determine correct exposure time, set the lens at f:16 and shoot at 3, 4 and 5 seconds. Develop the film and note which time gives the correct degree of exposure. This time should not vary while the same lighting is used for all work. ★ ★ ★

Upper photo, clamp shaped from aluminum flat holds camera on support arm, positioned above center of plywood base. Winding film does not move camera

Lamp standards made from 3/4-in. aluminum tubing fit snugly in clamps on triangular blocks, can be pulled loose easily when microfilming unit is stored

Thumbscrew, fitted in hole drilled and tapped at back of 3/4-in.-pipe tee, locks camera-support arm at any required height up and down length of column





Sample Hole Sizes in Hardboard Facilitate Bit Selection

To avoid the trial-and-error method of selecting the right size bit for drilling holes for bolts or screws of unknown diameters, drill a row of sample holes in a small square of tempered hardboard as shown. Fitting the bolt or screw into the correct hole determines bit size. Mark each hole with the bit size that corresponds to it.

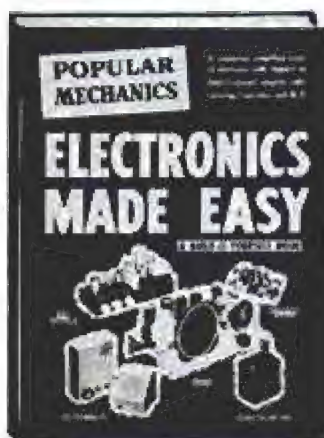
Masonite Corporation



Knife Sharpener Is Handy Tool For Deburring Sheet Metal

An ordinary kitchen knife sharpener, such as the one shown, makes an effective tool for deburring and smoothing the edges of sheet metal. Only a few strokes of the tool are required to remove sharp edges from the metal. If the sharpener has wall-mounting holes, it can be fastened to a wooden block shaped for easy gripping.

Harvey Muller, Danboro, Pa.



Enrich Your Life With the Marvels of Hi-Fi! Thrill to a Pocket-Size Transistor Radio . . .

Have you been wanting a Hi-Fi set for your home . . . a portable transistor radio no bigger than your hand . . . and any of the other pieces of electronic equipment that are adding so much enjoyment to modern living? Then here's how you can have them, at merely a fraction of the usual purchase price. Using Popular Mechanics' new book—*Electronics Made Easy*—

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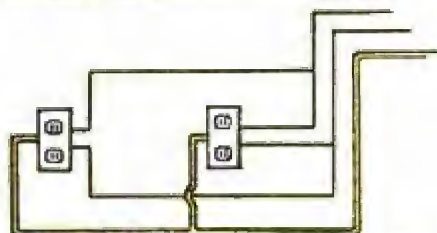
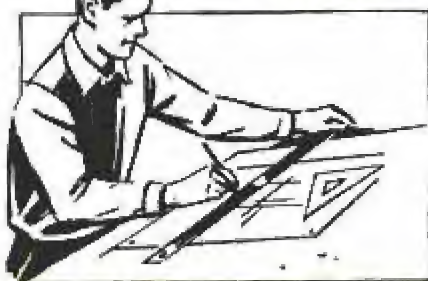
YOUR HOME WORKSHOP

The following 15 pages are devoted to setting up a shop, which may be laid out to hold costs to a minimum if you use it to make spare-time profits. Or, if you desire a shop for recreation purposes, it can be arranged to produce the most inviting environment in which to spend a few hours away from the day's cares. Regardless of the purpose, you are sure to find many suggestions that will be of help.

A WORKSHOP represents a sizable investment, or is likely to eventually. Therefore, its layout and equipping should be planned as carefully and with as much thought as any other sizable investment. A few tools thrown haphazardly on a bench or in a drawer are not conducive to good work or pride of ownership. Yet, the same investment in tools that are neatly arranged in a carefully planned layout have exactly the opposite effect on most of us—we are anxious to use them and create projects with them.

On the following pages *Popular Mechanics* offers many suggestions on planning, wiring, lighting and equipping a home shop. Here you will find answers to such questions as "Where shall I locate a shop—in a room in the house, in the basement, the garage or carport?" "How can I work out a good shop layout in the space available?" And what tools to buy, such as hand tools and power tools, as well as what equipment, such as benches and racks. Also recommended wire sizes, lamps, switches, etc.

PLANNING



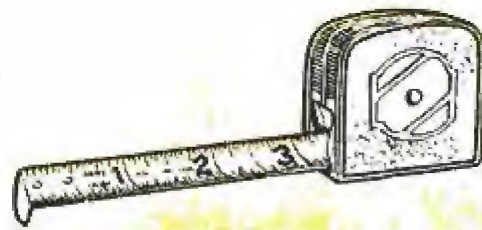
WIRING



HAND TOOLS



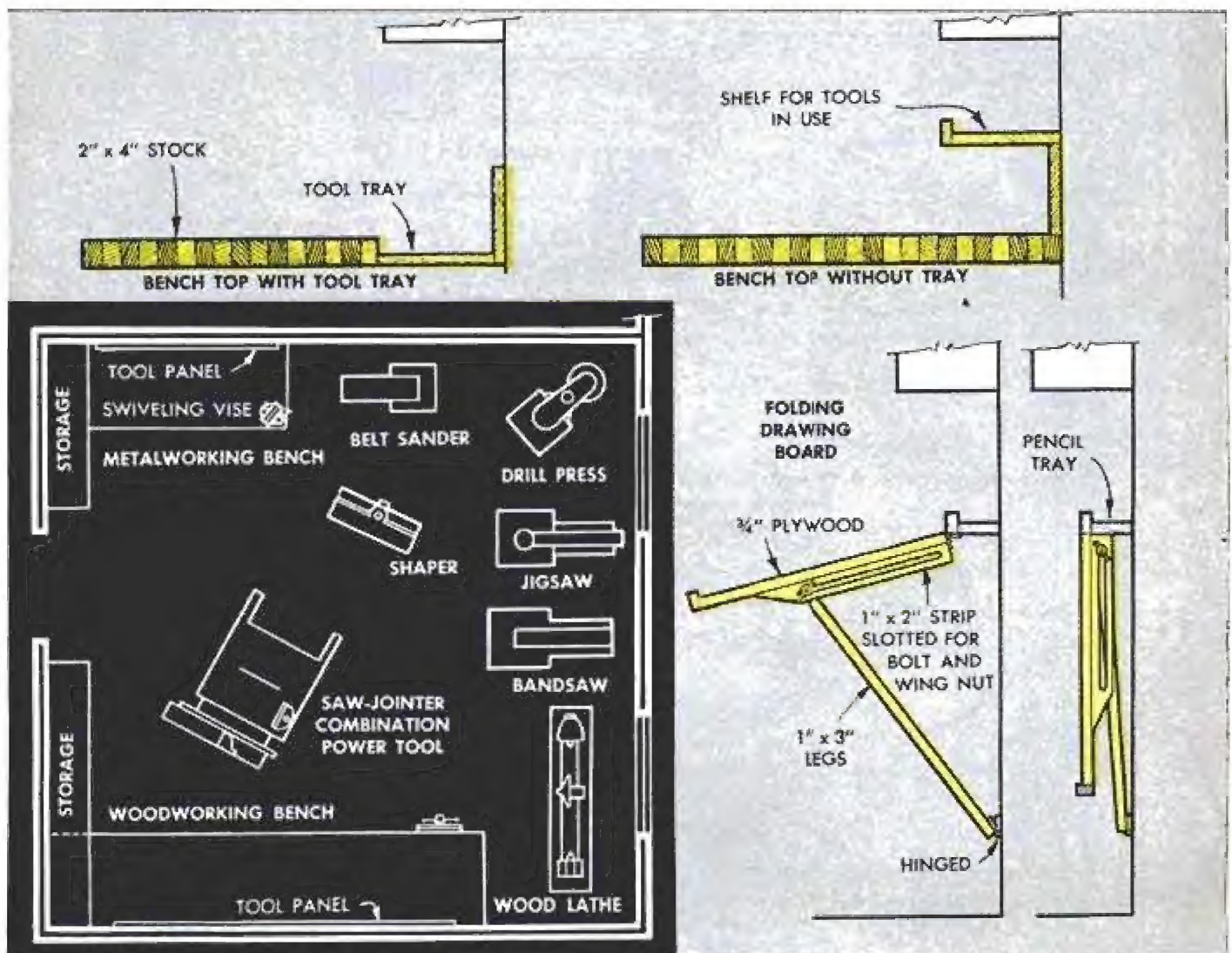
POWER TOOLS

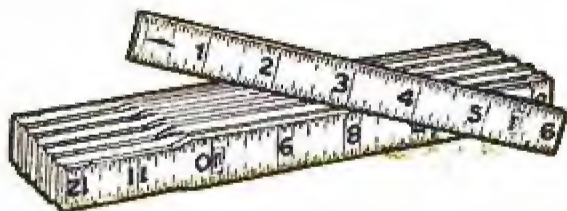


IT'S FUN TO PLAN a workshop as a part of leisure-time living. Your shop can be individual and at the same time practical, suited to the available space and the tools you will need to build home furnishings, make home repairs, build a boat or follow the hobby of your choice. But whether you are planning from scratch for all new shop equipment, or are planning greater efficiency from what you already have or intend to acquire, plan carefully with an eye to the future. Keep in mind that you are not setting up a production line of machines and supplementary tools for repeat operations. A single cabinet project may call for a hundred operations but only a few will be repetitive. Because of this you don't need precise figures and neither

do you need a detailed floor plan; a simple pencil sketch made to a scale of, say, $\frac{1}{2}$ in. equals 1 ft., will do the trick.

The floor plans below and on the opposite page suggest arrangement of equipment in a small, square room and in a long, narrow room. All power tools, with the possible exception of the wood lathe, should be on casters so that they can be moved about to clear the central floor area, or make room at one machine for a special job. Note that on both plans the circular saw-jointer combination tool is given the greatest amount of working space, first, because it is the most-used machine in the shop and second, because there must be an equal amount of workspace all around the unit. Other machines such as the belt



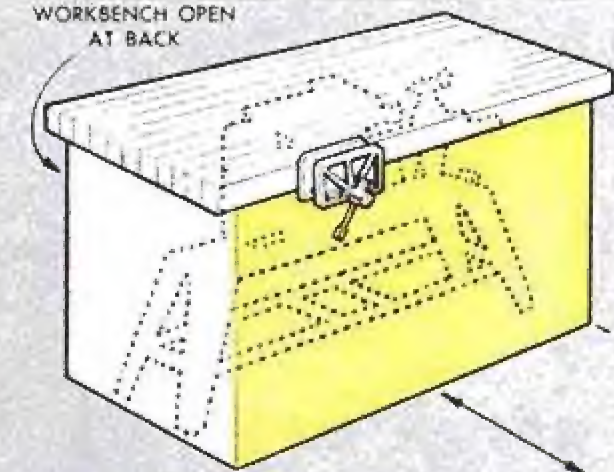


PLANNING

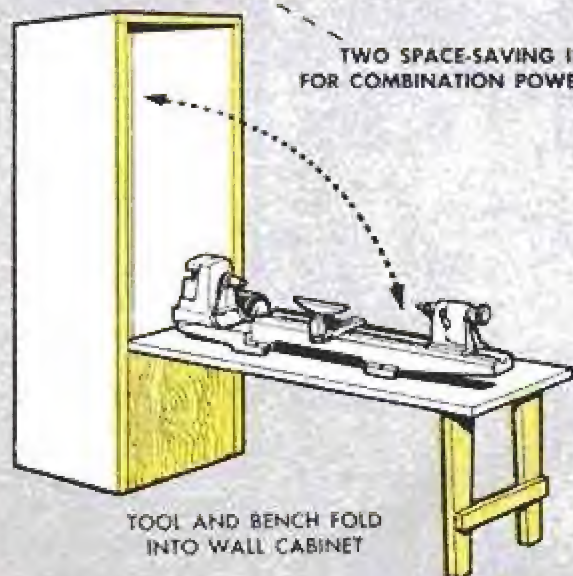
sander, drill press, jigsaw, shaper and band-saw require only a semicircular workspace in front of the machine and for this reason they can be ranged along the walls of the shop. When you have them mounted on casters they can be rolled anywhere on the shop floor for special jobs.

When you plan a workbench, plan big. Note the relative sizes of the workbenches on the two plans. Make the tops as large as the floor space will accommodate. Glue the stock with the edge up and cover with $\frac{1}{4}$ -in. hardboard attached with contact cement. Tops can be made with or without a tool tray as detailed on the opposite page. If floor space is limited, as in a garage or small room, then think about the two space-saving ideas detailed below. A workbench that is open at the back so that it can slide over a combination power tool is

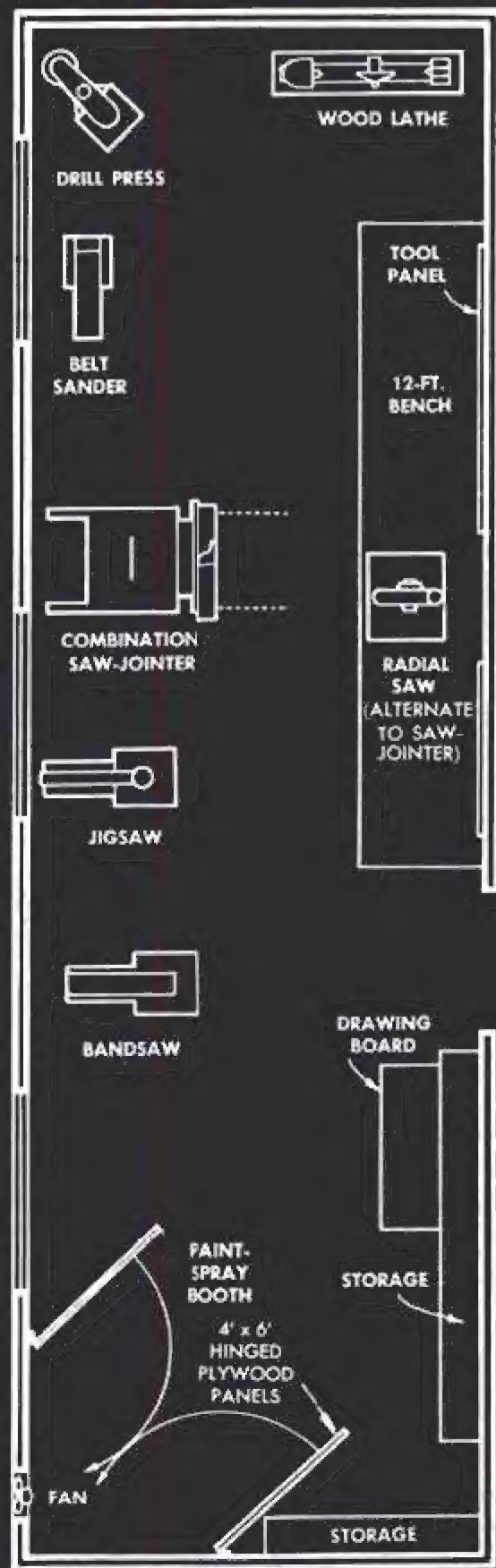
WORKBENCH OPEN AT BACK

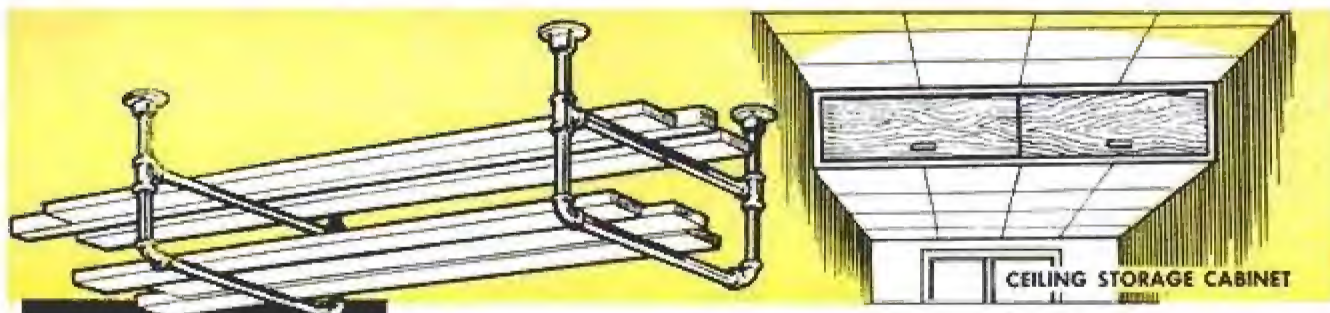


TWO SPACE-SAVING IDEAS FOR COMBINATION POWER TOOLS

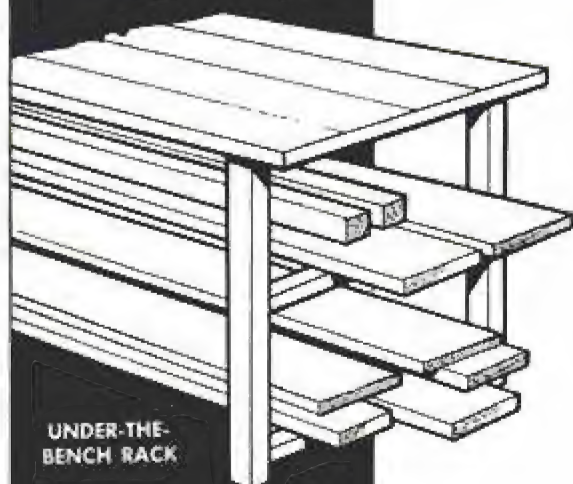


TOOL AND BENCH FOLD INTO WALL CABINET

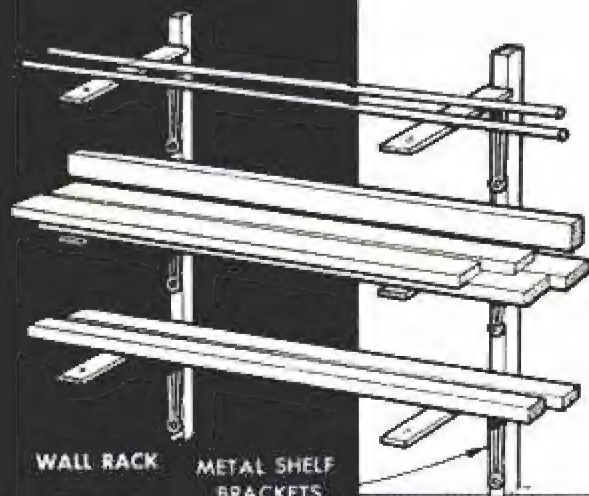




CEILING HANGERS



UNDER-THE-BENCH RACK



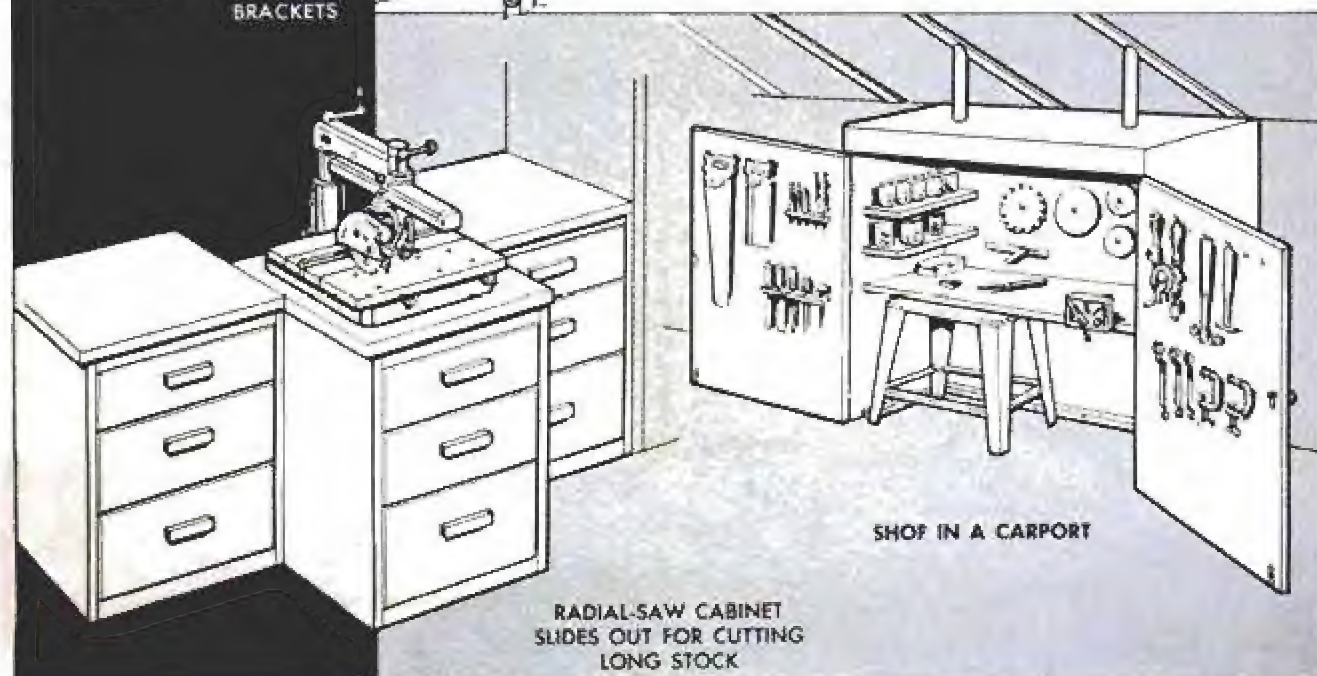
WALL RACK

METAL SHELF BRACKETS

a good economizer of space. So is the folding bench that can accommodate a single-purpose tool or a small combination power tool. And while you're thinking about space saving, study the suggestions for utilizing space in a carport and adding to present garage space with a leanto as detailed below and on the opposite page. Where you have room for only a carport shop and no space for conventional power equipment, then consider a portable electric handsaw with a floor stand (available from the manufacturer of your saw). When not used as a stationary unit, the saw can be detached from the floor stand and the latter stored under the bench as pictured. If you're cramped for space in a garage or basement workshop, locate your radial saw near a doorway and place it on a separate bench or stand so that you can slide it out to handle long stock. Of course, you can mount the cabinet or stand on casters and thus gain greater range and easier mobility.

Your bench grinder will be used periodically to sharpen tools but the rest of the time the problem is what to do with it. A simple solution is to bolt the grinder to a square piece of 2-in. stock and lock it in the bench vise when you use it. This arrangement makes a good "stand" and the grinder can be stored anywhere it is out of the way when not in use.

Along about this stage of planning your shop you will encounter the problem of stor-



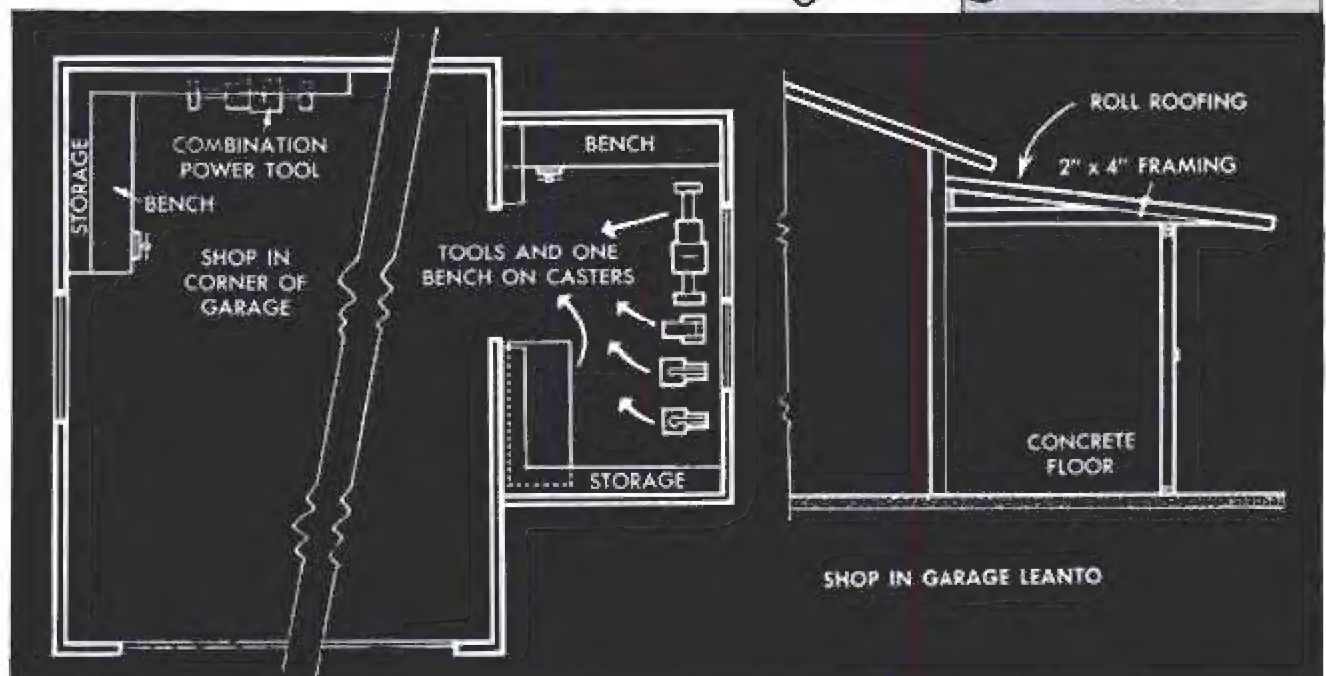
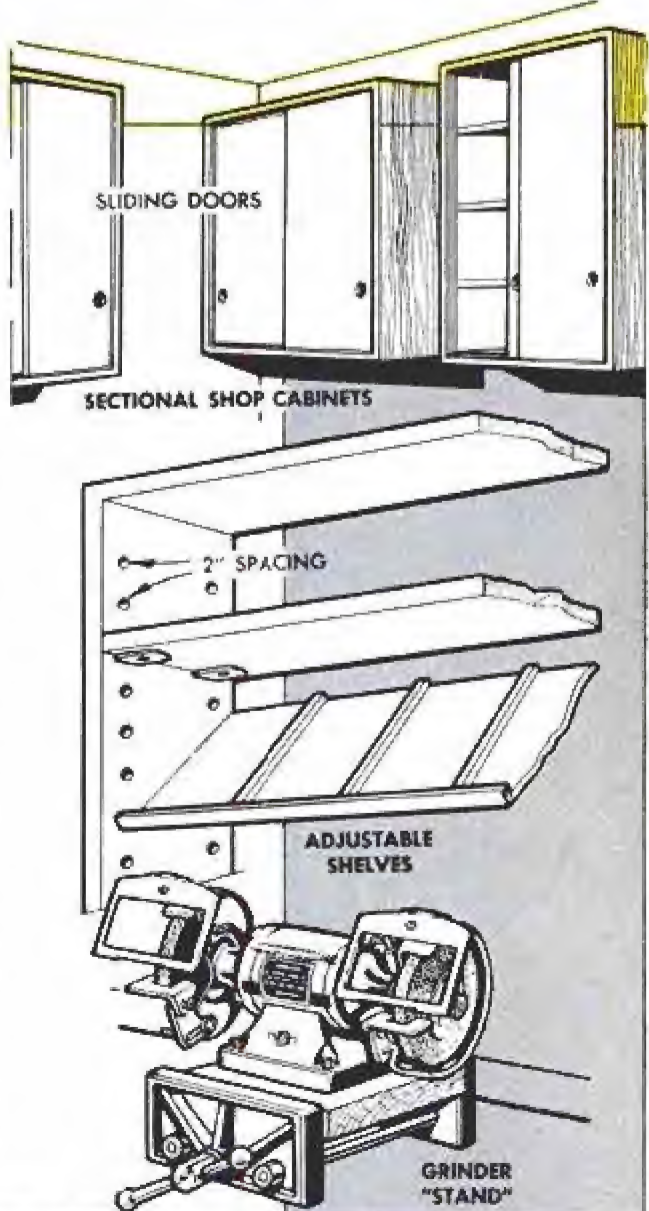
RADIAL-SAW CABINET
SLIDES OUT FOR CUTTING
LONG STOCK

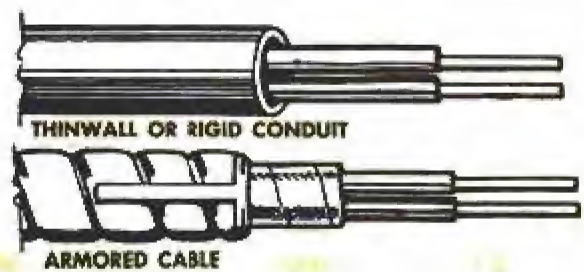
SHOP IN A CARPORT



PLANNING

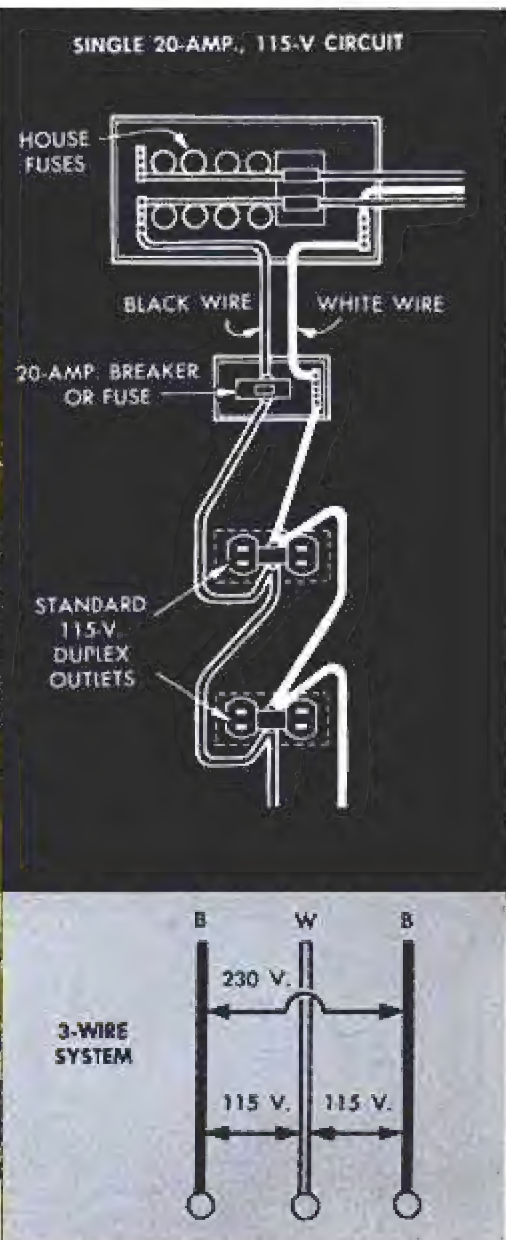
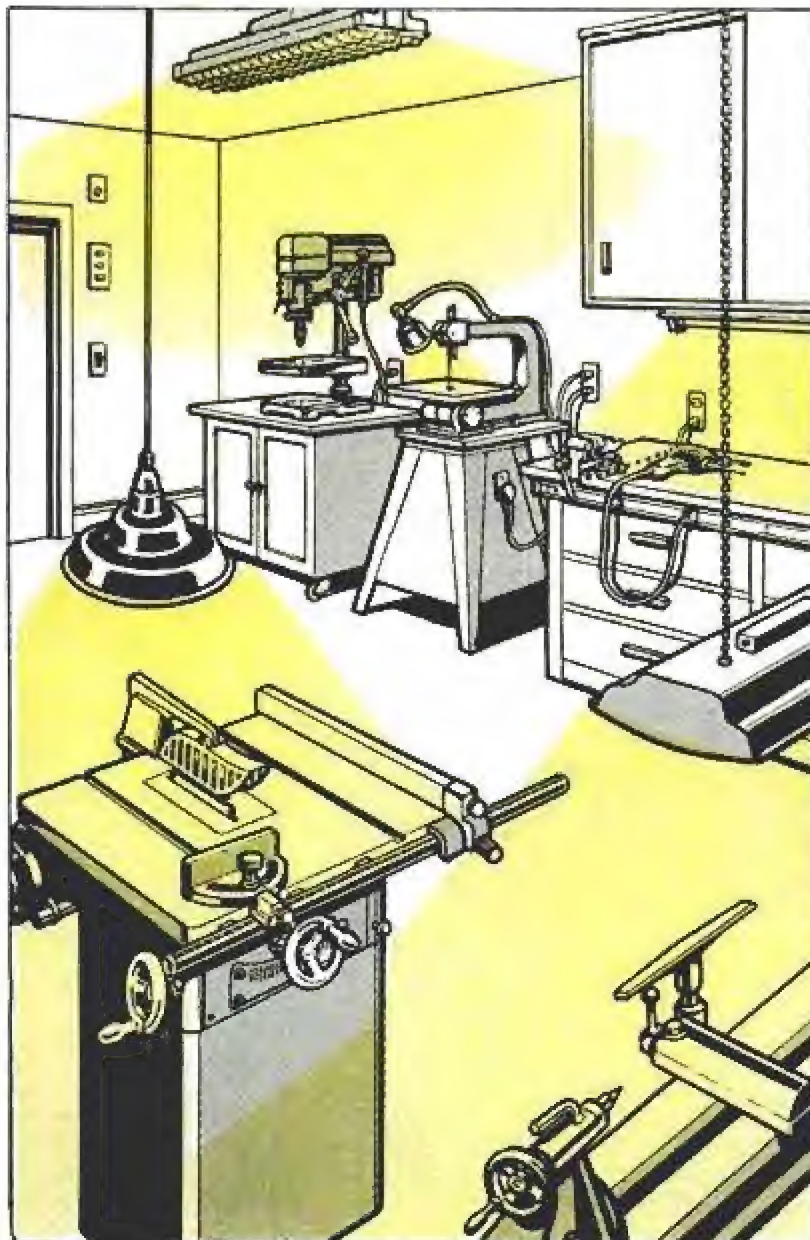
age — where to keep lumber, fancy woods, hand tools and the power-tool accessories, finishing materials and all the other items that complete the shop supplies and equipment. Wall racks, ceiling hangers and cabinets generally will take care of the lumber, but just what you do with these storage units on your shop plan will depend on ceiling height and the floor space you have available. Where the ceiling height will permit, hangers and ceiling cabinets, the latter built in like a wide soffit, will provide storage for ordinary lumber and choice hardwoods. If the ceiling is low and the floor space ample, then jot down the sizes and locations of wall racks on your plan, keeping these details in the same scale so that you know what space they will occupy. Wall panels are best for hand tools and power-tool accessories and sectional wall cabinets and racks with adjustable shelves provide for shop supplies and finishing materials. If your plan sketch permits two benches, make or purchase one bench of the open-frame type. Then the open frame can be fitted with cross-pieces and used as a rack for storage of short lengths of lumber. In close quarters, as in the garage leanto, such a bench can be mounted on casters so that it can be moved out into the garage for greater working space.





WHEN YOU PLAN WIRING for your shop count on having separate power and lighting circuits. Separate circuits eliminate the hazard of overheated wiring and dimming of shop lights when one of the larger motors is started or is momentarily overloaded. Although the 20-amp. appliance circuit diagrammed below will carry the load of an average household appliance along with that of even a $\frac{3}{4}$ -hp. saw motor, the load is approaching the maximum permissible on that particular circuit. Add one more appliance or motor and the breaker may trip or a fuse go out.

That's why, at the outset, it's a good idea to plan the installation of the dual 20-amp., 115/230-v. circuit you see diagrammed below and on the opposite page. This 3-wire circuit is ideal for a workshop and as a rule it is more economical than installing two separate power circuits in the conventional manner in either an old or new home-wiring system. By drawing from both black wires of the service entrance, as diagrammed, it gives you two 20-amp., 115-v. power circuits. Split-wired duplex outlets are, of course, necessary in this system. These are the same as ordinary





NONMETALLIC CABLE WITH GROUND WIRE

WIRING

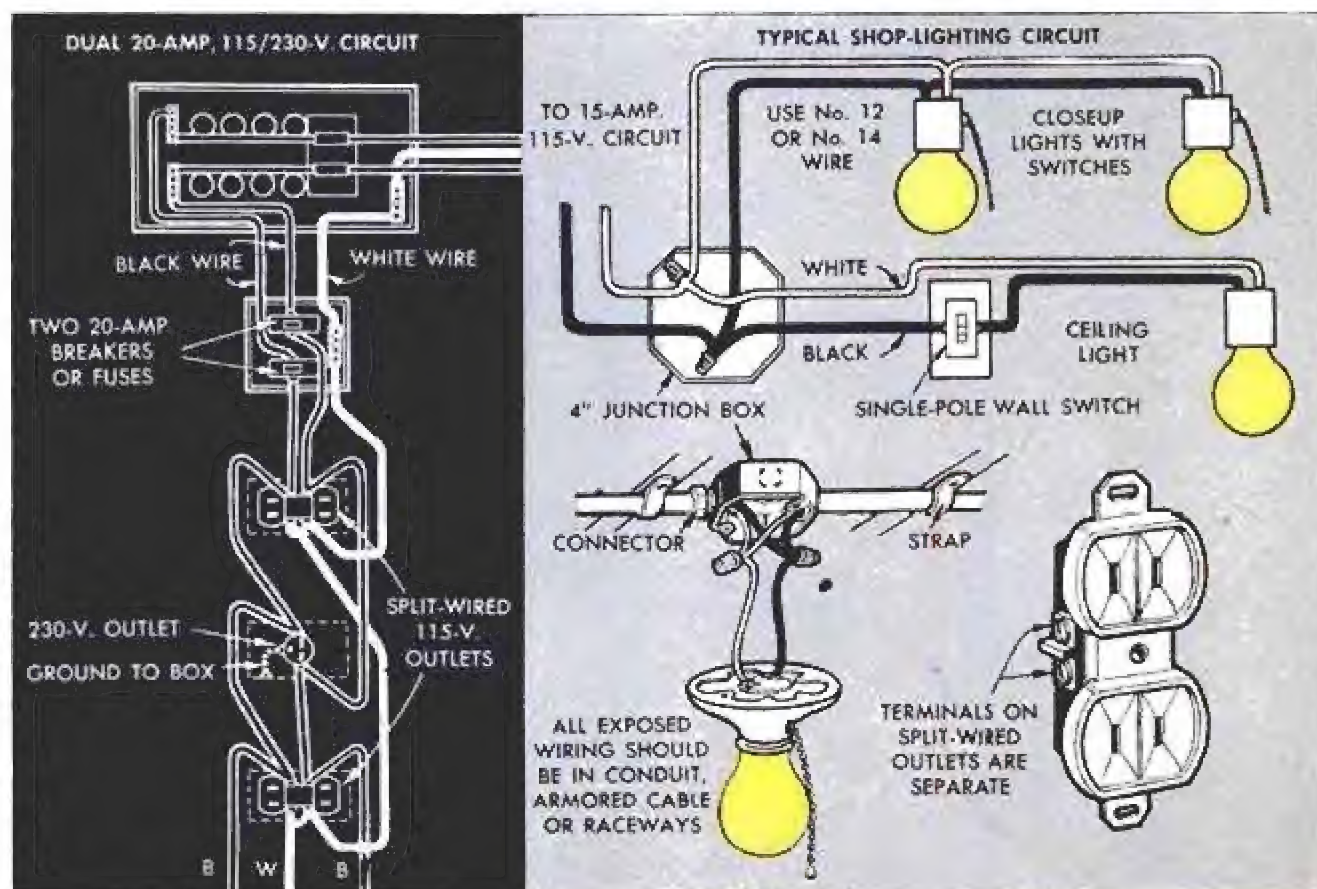
duplex outlets except that the two halves are not interconnected. The top half of each outlet usually is kept on one 115-v. circuit and the bottom outlet on the other.

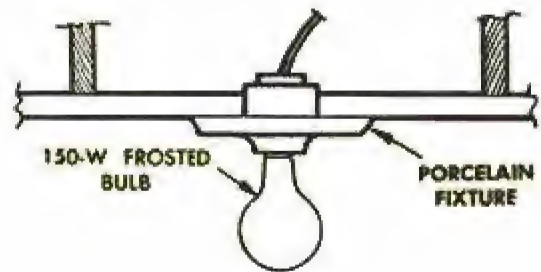
This wiring system gives the greatest flexibility in powering the shop motors. To equalize the load on the two 115-v. circuits of the system, you simply plug the various power tools alternately into the upper and lower halves of the duplex outlets. It also provides a 230-v. outlet for any motor designed to operate on 115 or 230-v. current. Motors $\frac{3}{4}$ hp. and larger operate more efficiently and draw less amperage when powered by the higher voltage.

Adequate shop wiring begins at the service entrance. On older homes especially, the entrance box may be rated at less than 100 amp. and have only two source wires. If this is the case, it should be replaced with an entrance unit having at least a 100-amp. rating. From the entrance box the supply lines can be brought direct to the shop as indicated in the typical shop-wiring diagram on the following page.

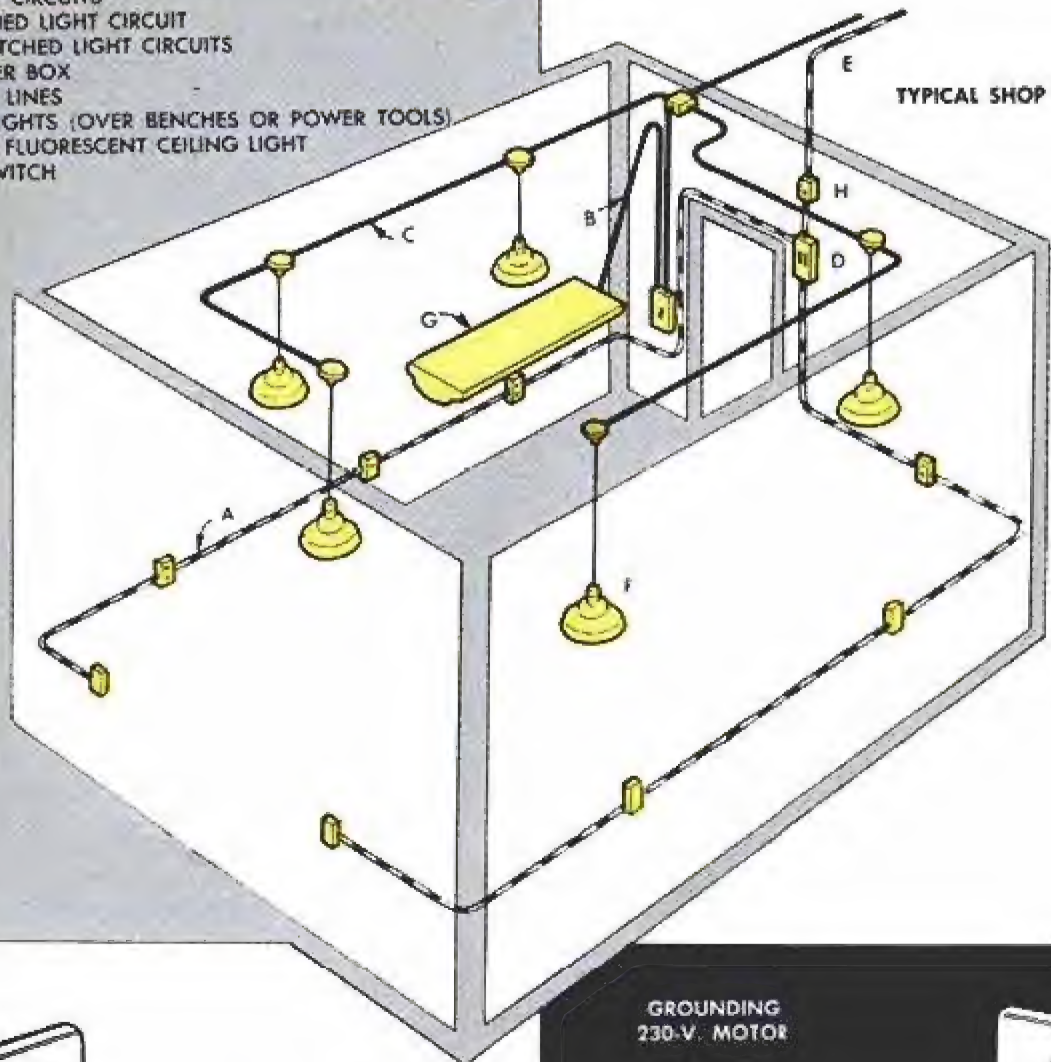
Here, the power line can be brought to a fuse box through a key switch, H, or to a breaker, D, in which case the key switch is not needed. The main purpose of the key switch or breaker installation (the latter is to be preferred) is to provide you with a positive means of cutting off all power to the shop tools when you leave the room. Locate the unit near the door and high enough to be well beyond a child's reach. If you do use a fuse box, install plug fuses of the time-delay type.

If the distance from your service entrance to the shop is less than 50 ft., No. 12 wire will do for the power line. But on leads of 50 ft. or more, or when more than one circuit is supplied, then No. 10 wire is the minimum size with No. 8 wire perhaps the best choice. Around shop walls to power outlets No. 12 wire usually is the size recommended. Although not shown on the shop wiring diagram you may wish to use prewired raceway strips which have outlets spaced every 12 in. or so. These often are preferable to indi-

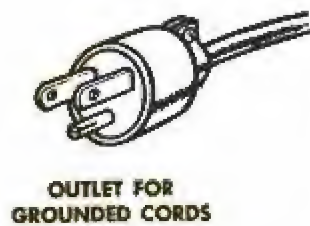




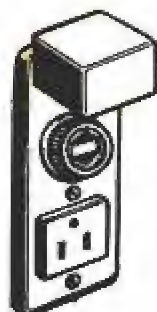
- A—POWER CIRCUITS
- B—SWITCHED LIGHT CIRCUIT
- C—UNSWITCHED LIGHT CIRCUITS
- D—BREAKER BOX
- E—SUPPLY LINES
- F—DROP LIGHTS (OVER BENCHES OR POWER TOOLS)
- G—LARGE FLUORESCENT CEILING LIGHT
- H—KEY SWITCH



TYPICAL SHOP WIRING



OUTLET FOR GROUNDED CORDS



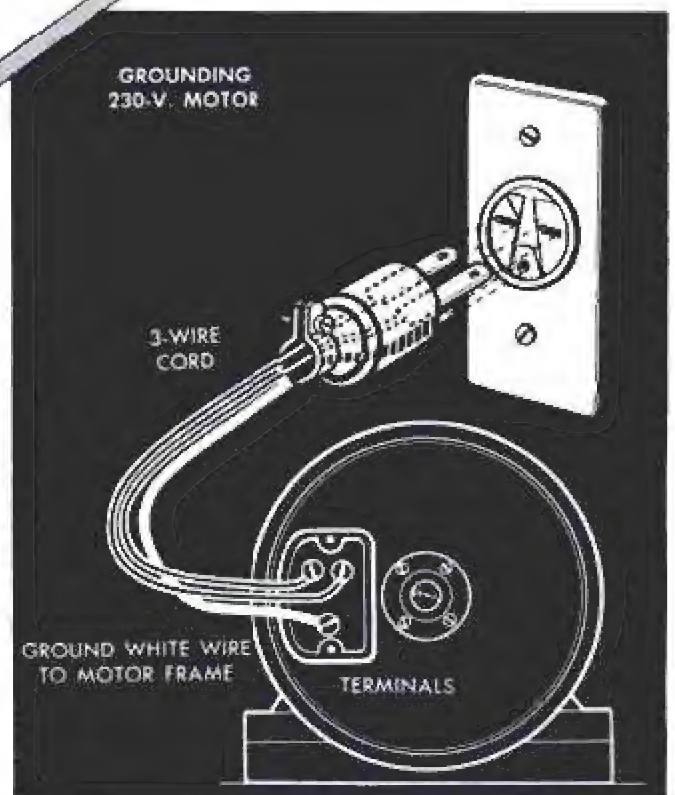
FUSED OUTLET



230-V. OUTLET



115/230-V. OUTLET

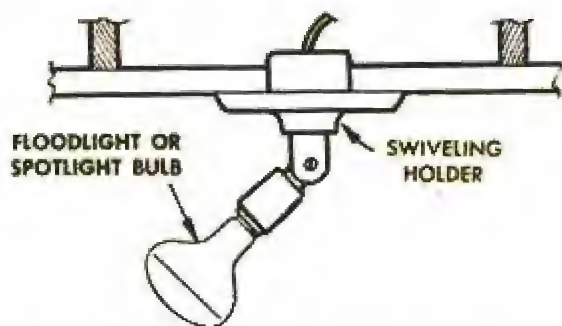


GROUNDING 230-V. MOTOR

3-WIRE CORD

GROUND WHITE WIRE TO MOTOR FRAME

TERMINALS



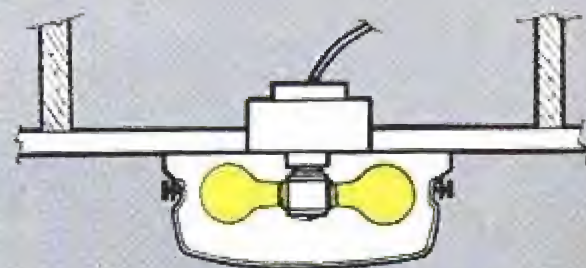
vidual outlets. In any case, power circuits should have continuous grounding.

The manner of lighting the shop is an individual problem. If the ceiling is low, as in a basement, then you may wish to utilize some of the suggested ceiling-light installations detailed on these pages. On the other hand, if the ceiling is high, as in a room in an older home, an unswitched lighting circuit with drops over the individual power tools may prove the best solution. Note the unswitched circuit, C, in the shop wiring diagram. Here only the fluorescent ceiling fixture is on a switched circuit. Individual tool lights are handy for closeup work and traveling lights also are useful in some shop-lighting plans. If the room is long and narrow as on one of the floor plans, you'll need more than one ceiling fixture for adequate general lighting. Don't figure daylight values in your shop-lighting plans. And be sure before installing any shop wiring in either an old or new home to plan the power and lighting circuits to take care of any future additions in power tools or lights. Know your local electrical codes before installing any new wiring.

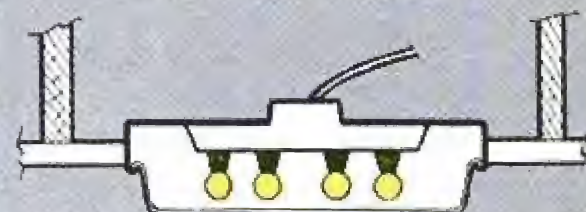
WIRING



FLOODLIGHT IN RECESSED CEILING FIXTURE

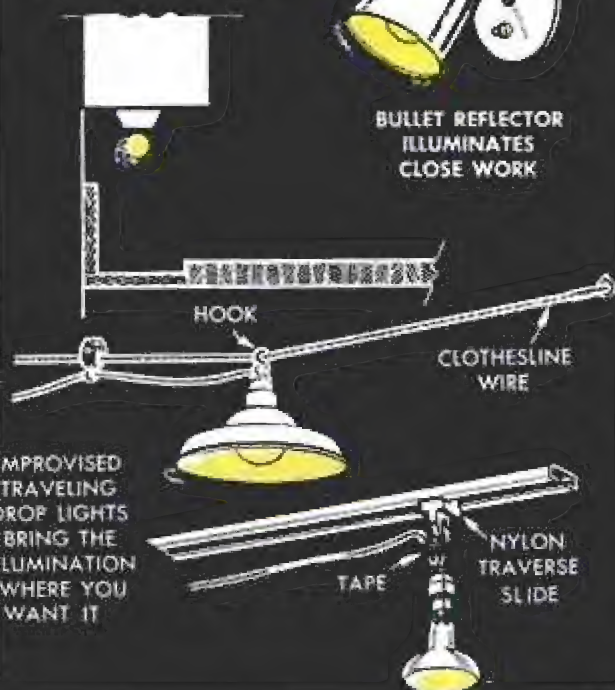


GLASS-BOWL KITCHEN OR BATHROOM FIXTURE IS INEXPENSIVE, GIVES GOOD GENERAL ILLUMINATION



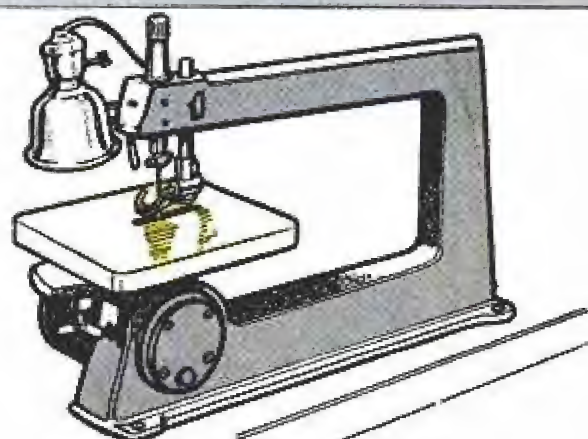
BEST GENERAL SHOP LIGHT IS LARGER RECESSED FLUORESCENT FIXTURE CENTRALLY LOCATED IN CEILING

OPEN FLUORESCENT TUBE UNDER TOOL CABINET



BULLET REFLECTOR ILLUMINATES CLOSE WORK

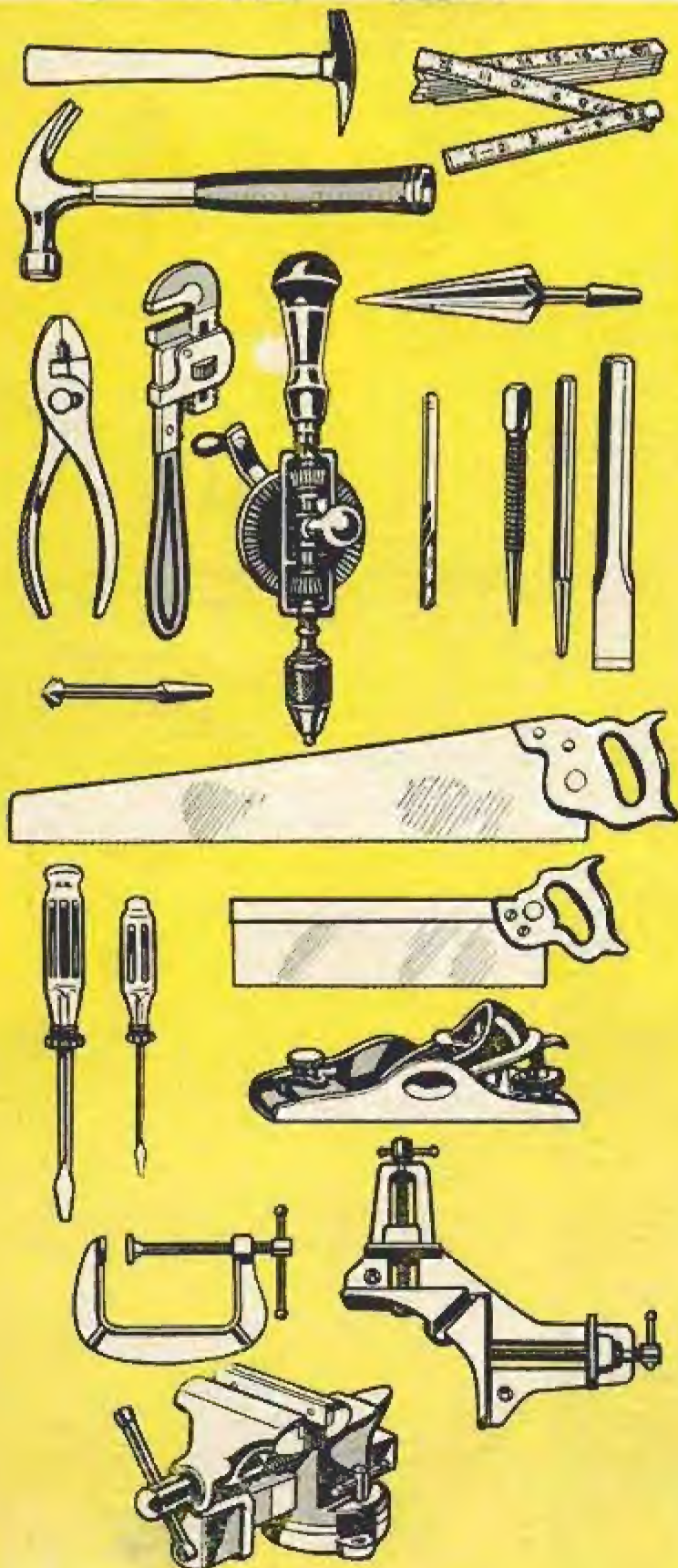
IMPROVED TRAVELING DROP LIGHTS BRING THE ILLUMINATION WHERE YOU WANT IT



TOOL LIGHT SPOTLIGHTS GAUGE LINES



OPEN REFLECTOR LIGHTS WORKBENCH



ALTHOUGH MANY HAND tools are supplementary or entirely unnecessary in a shop fully equipped with power tools, some hand tools such as hammers, clamps, rules, wrenches, pliers and vises are indispensable. As an example, if you have a drill press with accessories, you may not need a hand brace and bits. If you already have a jointer and a surfacer, as pictured on the following pages, you can get along without hand planes. If you have a portable circular saw, you may do without a hand saw.

But one should keep in mind that a fairly complete kit of the common hand tools is useful, almost indispensable, in making

Home Repair Toolkit

CURVED-CLAW HAMMER 13-oz. head

SCREWDRIVERS (2" and 4")

6" SLIP-JOINT PLIERS

6-ft. TAPE RULE or **FOLDING RULE**

PUTTY KNIFE with either regular or wide blade

9" ADJUSTABLE WRENCH

10" PIPE WRENCH

HAND DRILL with assorted bits

MARKING GAUGE

CROSSCUT SAW (8 to 10 teeth to the inch)

SOLDERING IRON (100-W. or larger)

10" TRY SQUARE (or combination square)

HACKSAW (for 10" to 12" blade)

1/4" and 1/2" WOOD CHISELS

FOUR 8" FILES WITH HANDLES (one 3-cornered file, one mill file, one each round and half-round)

VISE WITH 2 1/2" JAWS (or woodworking vise with rapid-acting screw)

1/16" NAIL SET

KEYHOLE SAW

CENTER PUNCH

AUGER-BIT BRACE (ratchet type)

AUGER BITS (1/4" to 1/2" by 16ths)

7" BLOCK PLANE

8" SMOOTH PLANE

COMBINATION OILSTONE

C-CLAMPS (two each of 2", 3" and 6" sizes)

LEVEL

KNIFE (with replaceable blades)

SANDING BLOCK (and assorted grades of sandpaper)

HAND TOOLS

those simple home repairs. So, the best thing to do is buy hand tools as you need them unless, of course, you already have a fairly complete kit.

Although a list of hand tools rarely meets all individual requirements, it can serve as a guide from which you can select those you do need. The two lists on these pages are offered as suggestions to help you in making a selection. In some cases you have a choice between tools which have similar applications. One example is the steel (carpenter's) square and the combination square. In most home shops the combination square will serve the purpose. Not all tools listed below are illustrated.

Add These as Needed

MAGNETIC TACK HAMMER

8" SCREWDRIVER

COPING SAW

SET OF OPEN-END WRENCHES (6/16" to 7/8")

8" OR 10" ADJUSTABLE END WRENCH

26" RIPPING SAW

18" BACK SAW (for miter box)

MITER BOX

12-oz. BALL PEEN HAMMER

ADDITIONAL AUGER BITS (1/2" to 1" by 16ths)

EXPANSIVE BIT (5/8" to 1 3/4")

TWIST DRILLS (number sizes 1 to 60, fractional sizes 1/16" to 1/4" or larger)

SOLDERING TORCH (for flame soldering)

ADDITIONAL WOOD CHISELS (3/4" and 1", or larger)

BAR CLAMPS (two 24", two or more 36" or longer)

MITER CLAMPS

SIDE-CUTTING PLIERS

LONG-NOSE PLIERS

11" JACK PLANE

18" FORE PLANE

1/4" AND 1/2" INSIDE OR OUTSIDE GOUGES (or both)

ASSORTED SIZES OF FILES (as needed)

FILE-CLEANING BRUSH

PIN PUNCHES (set of four in graduated sizes)

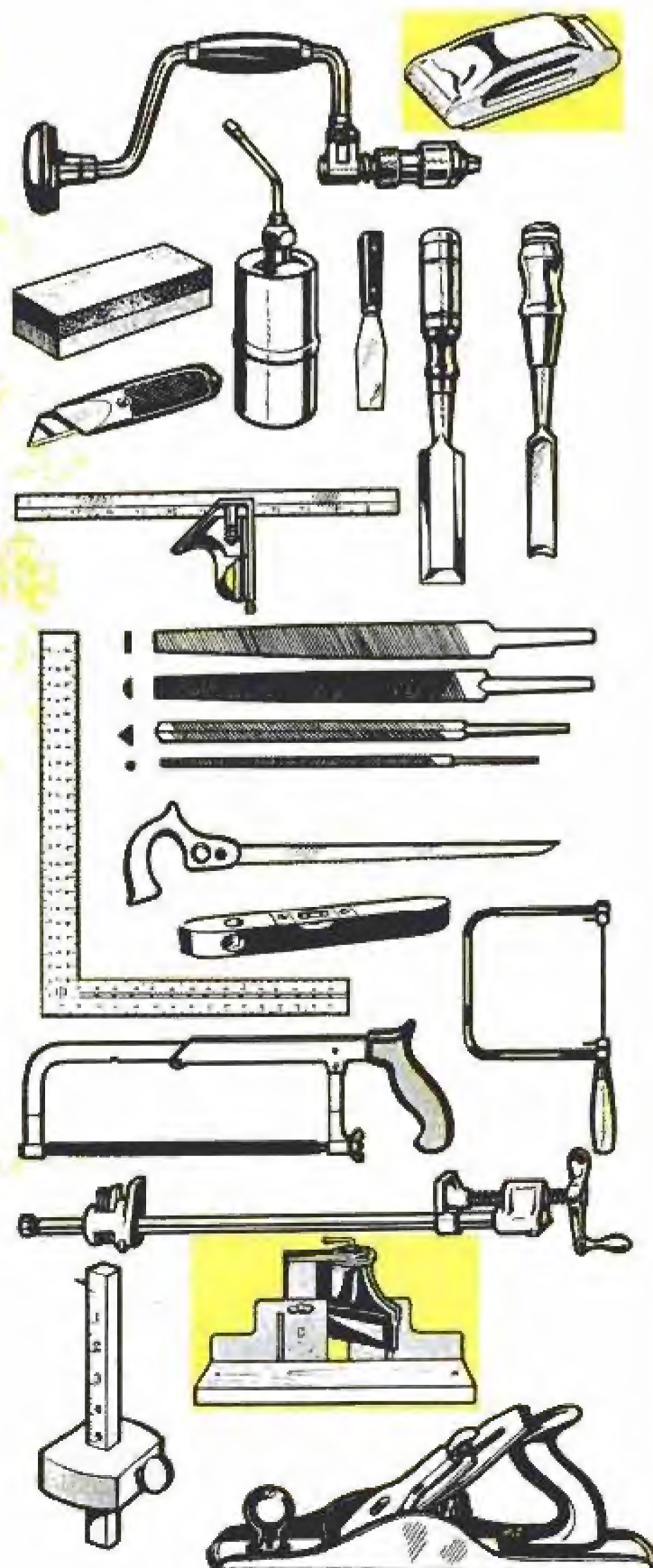
TAPERED REAMERS (two sizes, 1/8" to 1/2" and 1/4" to 3/8", to fit auger brace)

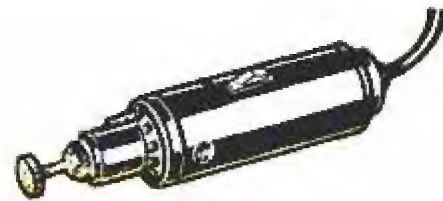
1/4" AND 1/2" COLD CHISELS

ROSEHEAD COUNTERSINK FOR SCREW-HEADS (to fit auger-bit brace)

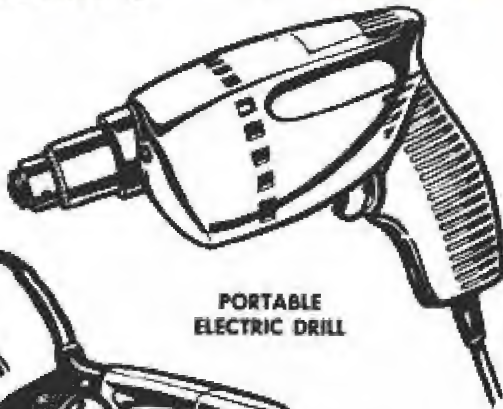
BENCH BRUSH

Many tools such as chisels, punches and auger bits are available in sets. Usually these are more useful and more economical to buy.

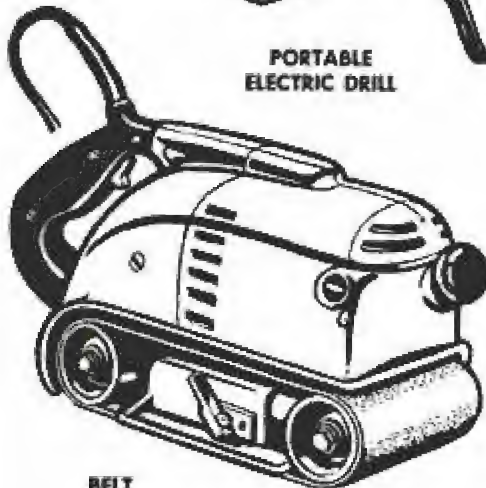




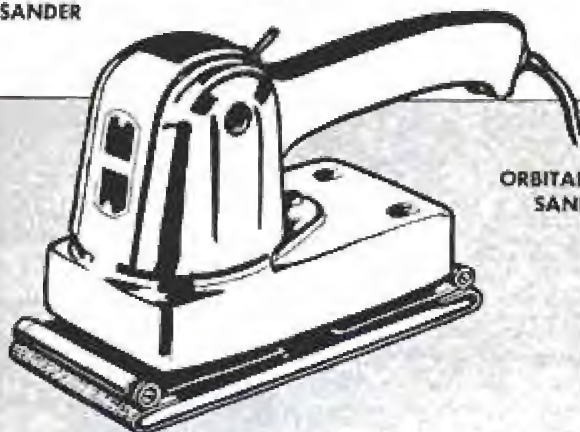
HIGH-SPEED
HAND GRINDER



PORTABLE
ELECTRIC DRILL

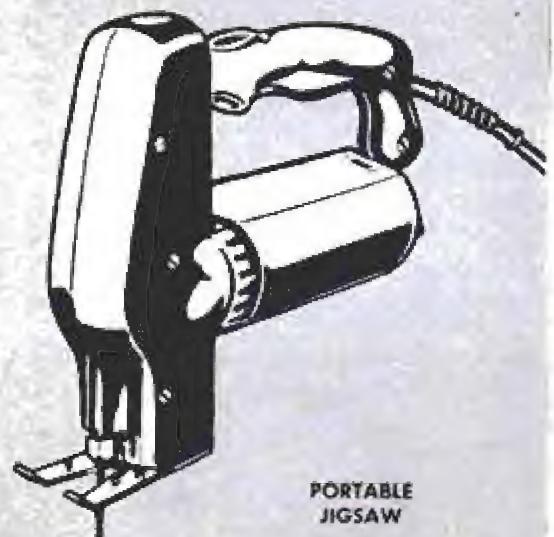
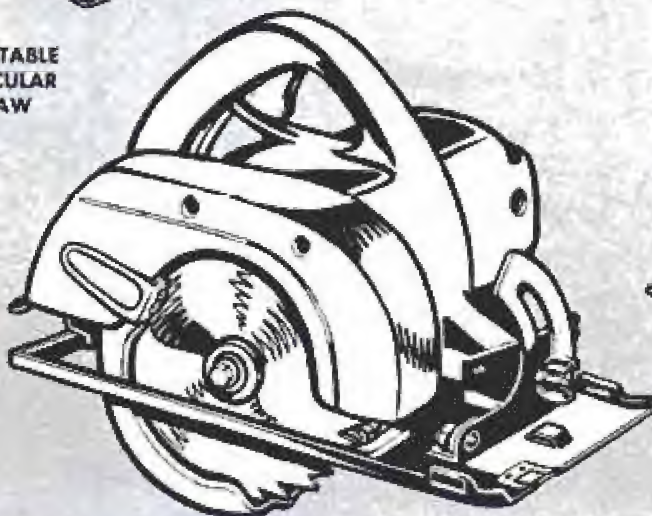


BELT
SANDER



ORBITAL (PAD)
SANDER

PORTABLE
CIRCULAR
SAW



PORTABLE
JIGSAW

IF YOU EQUIP YOUR SHOP with the portable electric tools shown on this page, you can do the common power-tool operations, such as squaring and ripping stock to size, jigsawing scrollwork, drilling, dadoing, and the rough and finish sanding preparatory to finishing the project. That about covers construction of home built-ins, small-boat construction, building a garage or making outdoor furniture. But for cabinetmaking you'll need supplementary hand tools to cut mortises, plane stock to such thicknesses as may be required and joint edges true for gluing stock to wide widths.

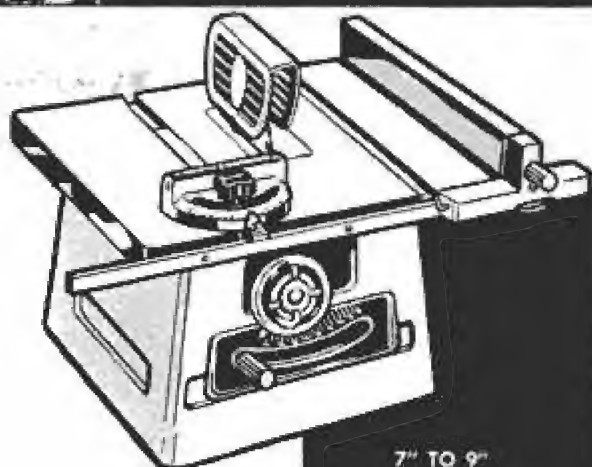
One feature of all portable tools, that is, those which are held in the hand when operated, should be kept in mind when planning your shop equipment: the portable power tool is carried to the work. This can be an important time, step and space saver when your shop is small, when the job calls for cutting large sheets of plywood or similar materials, or where the project is being built at some distance from

POWER TOOLS

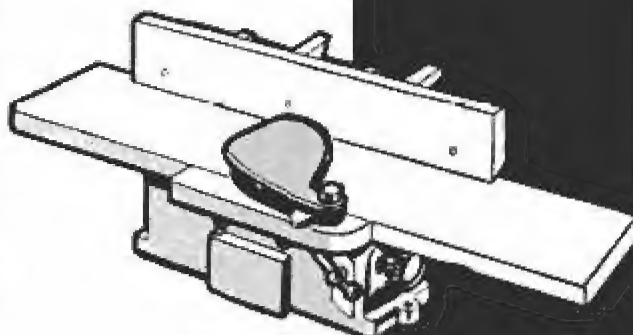
the shop. Another point in favor of portable tools is the small space required for storing the units when not in use.

Three of the tools shown — the hand grinder, portable drill and circular saw — are available with a range of accessories which make each a small power shop in itself.

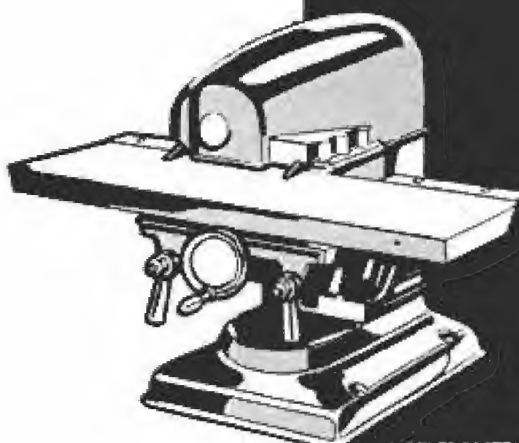
But when you plan shop equipment, consider first the range of usefulness of each tool when measured by your individual needs. Think also about how the addition of other power tools can enlarge the scope and range of shop work. If you have the craftsman's feeling for fine cabinetwork, either modern or traditional, you may like the stationary power tools best. For example, with the stationary (bench-type) power tools shown on this page you can do every operation on a cabinet which requires cutting stock to dimension, jointing edges of stock true for gluing to wider widths, planing stock to various thicknesses which may be required, cutting grooves and rabbets, running the straight and curved moldings required by the design, and making any turnings the construction may call for. But to assemble



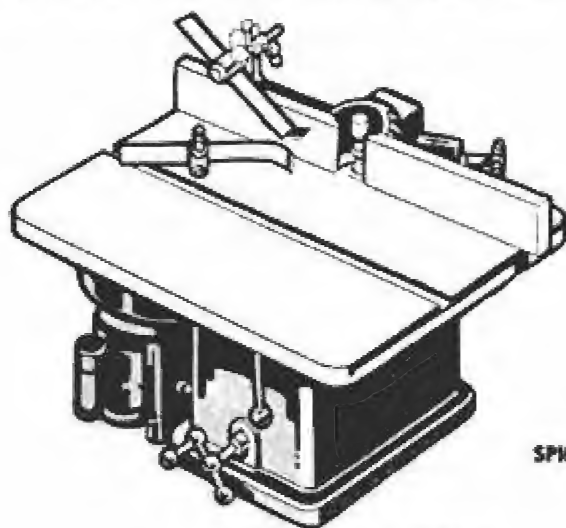
7" TO 9"
CIRCULAR
SAW



4" OR 6"
JOINTER

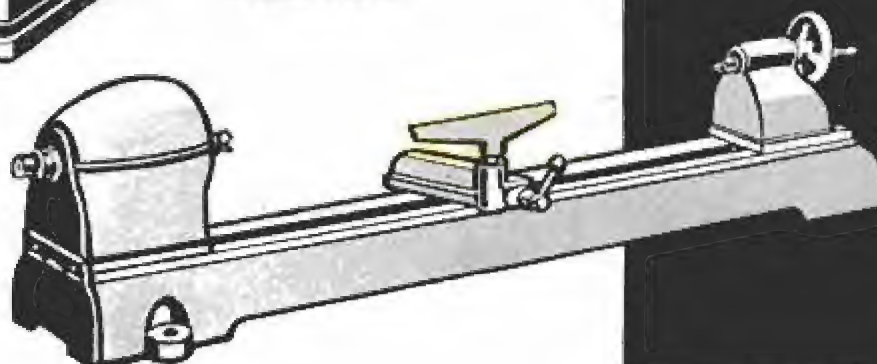


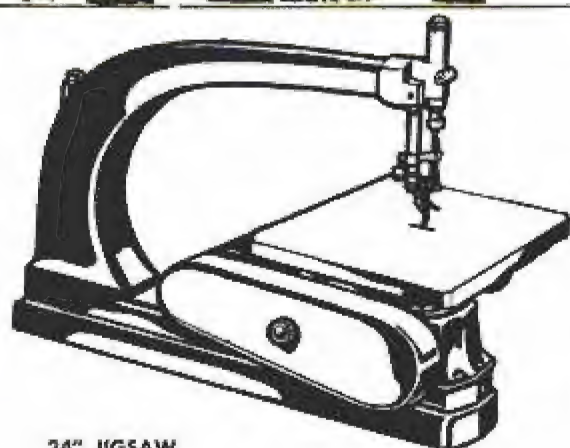
6" PLANER
OR SURFACER



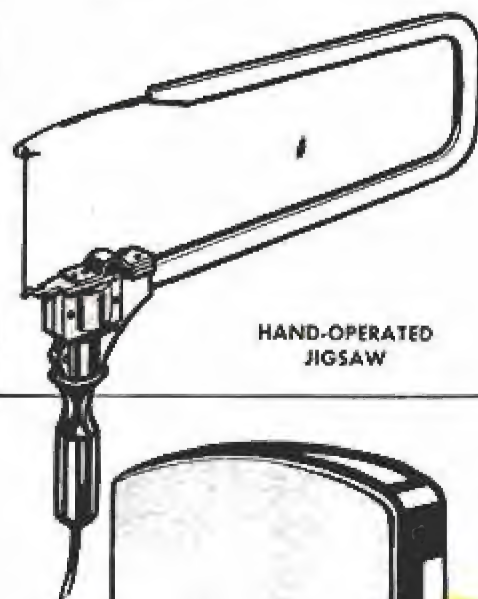
SPINDLE SHAPER

12" WOOD-
TURNING
LATHE

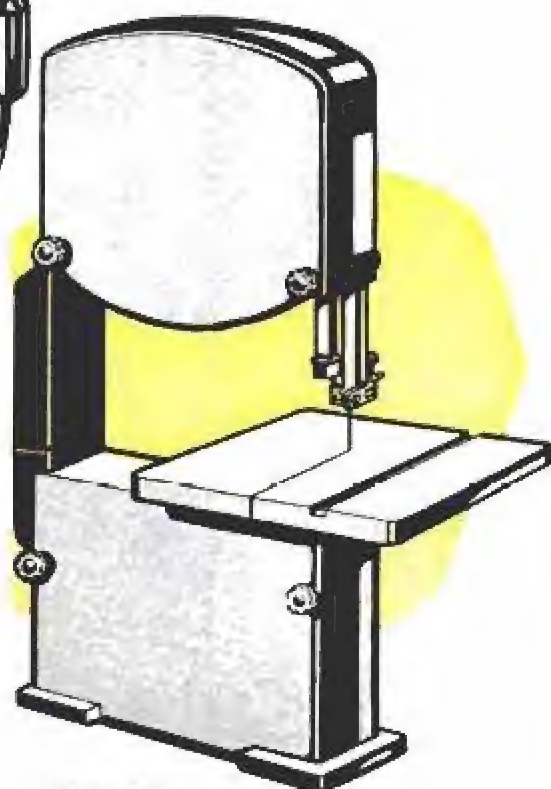




24" JIGSAW



HAND-OPERATED
JIGSAW

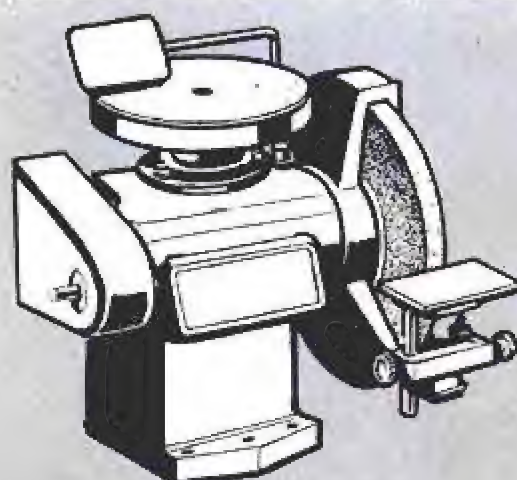


12" OR 14"
BANDSAW

and finish the project you still will need the portable drill, the sanders and also the jigsaw if any curved cuts are required by the design. You also will need chisels and a wooden mallet or hammer to finish the mortises square. Or, you can carry out all these final operations with the supplementary hand tools such as the brace and bits, wood chisels, hand-sanding pads and a coping saw for the curved cuts.

Now to go a step farther toward a complete machine-made project. Add the jigsaw, the bandsaw and the drill press shown on these pages and you have the necessary stationary equipment. The jigsaw and bandsaw will enable you to handle the curved cuts. The bandsaw will make any curved cut starting from the edge of the stock. The jigsaw will make curved cuts starting from the edge and also will make any curved cut which does not permit running in from the edge. The drill press with accessory mortising equipment will handle mortises up to $\frac{1}{2}$ in. wide. Matching tenons are cut on the circular saw.

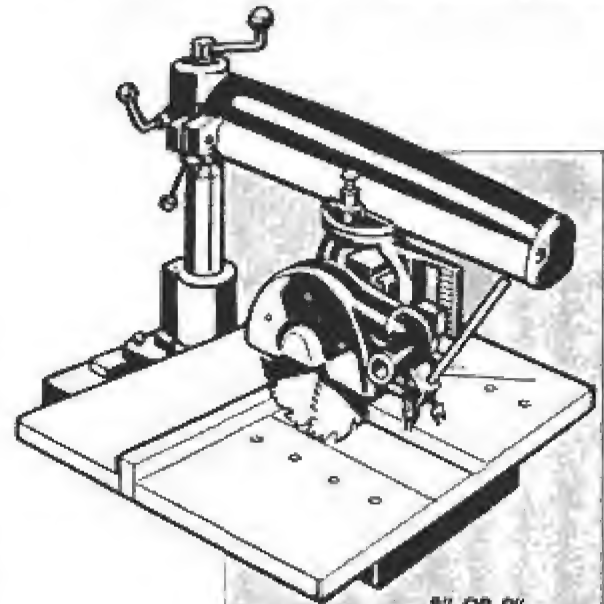
Now, before going farther there are several points to be noted: The work must be carried to the stationary power unit, never the unit to the work. Also, portable power tools often fit in well with stationary power tools and in some cases can supplant them. For example, suppose you already have all the portable power tools pictured on page 208. The two sanders you will always have



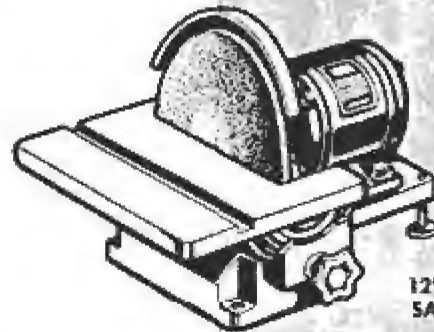
COMBINATION GRINDER
AND HONE

use for; the same is true of the portable drill. The portable jigsaw, as an example, can substitute for both the 24-in. jigsaw and the bandsaw. Although somewhat slower, it will make any common curved cut that can be made with either of these machines on stock up to 2 in. or so in thickness. Of course, the portable unit will not work in as short a radius, due to its saber-type blade, as the conventional jigsaw or bandsaw and the cut will not be quite as smooth. Any portable power tool designed to be operated freehand cannot be expected to equal the fine accuracy of the conventional stationary units where squareness of cut or size are factors. When used with floor or bench stands which are available as accessories, the portable electric drill, circular saw and jigsaw approach the conventional stationary units in accuracy of cut on such common operations as crosscutting, ripping, mitering, drilling and jigsawing. Such portable tools as the sanders do not classify with the others as accuracy of cut is not a factor in their operation. Keep these differences in mind when selecting portable and stationary power tools.

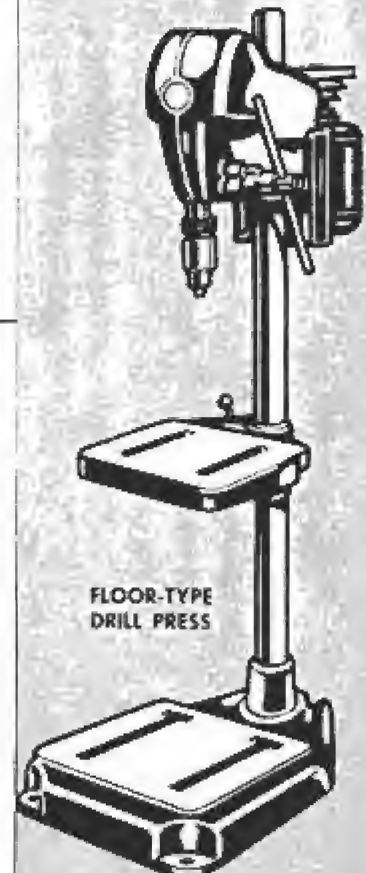
If you're strapped for shop space and there's no practical way to enlarge the working area, then consider a combination power unit such as that illustrated below. Basically it combines a circular saw, drill press and wood lathe in a single stationary floor-type unit. A jointer, bandsaw, jigsaw and paint sprayer are available as accessories for some combination units. Special-purpose tools are the



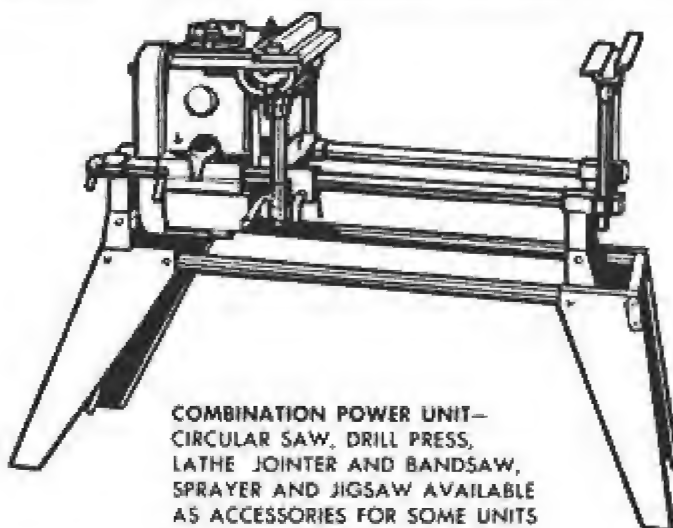
8" OR 9"
RADIAL SAW



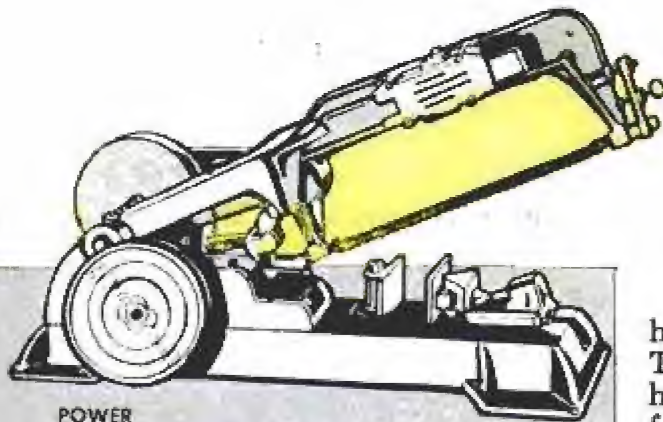
12" DISK
SANDER



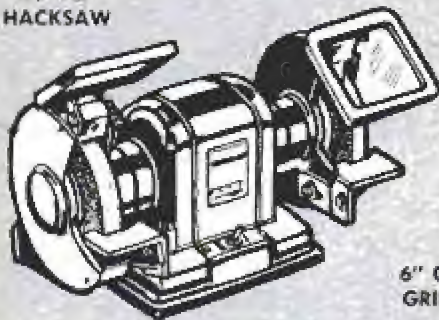
FLOOR-TYPE
DRILL PRESS



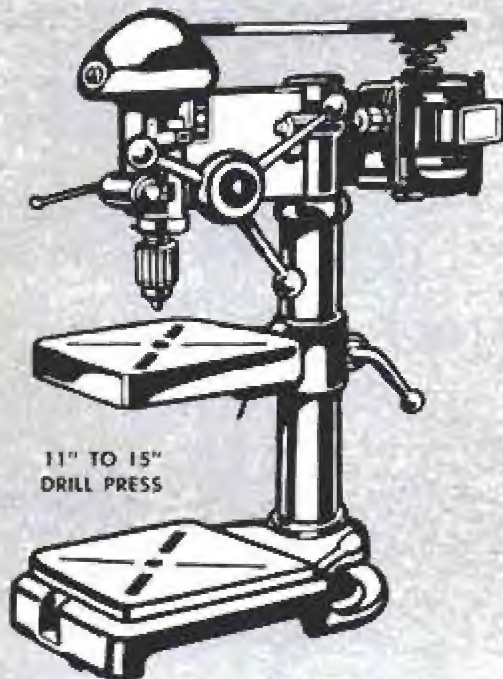
COMBINATION POWER UNIT—
CIRCULAR SAW, DRILL PRESS,
LATHE JOINTER AND BANDSAW,
SPRAYER AND JIGSAW AVAILABLE
AS ACCESSORIES FOR SOME UNITS



POWER
HACKSAW



6" OR 8"
GRINDER

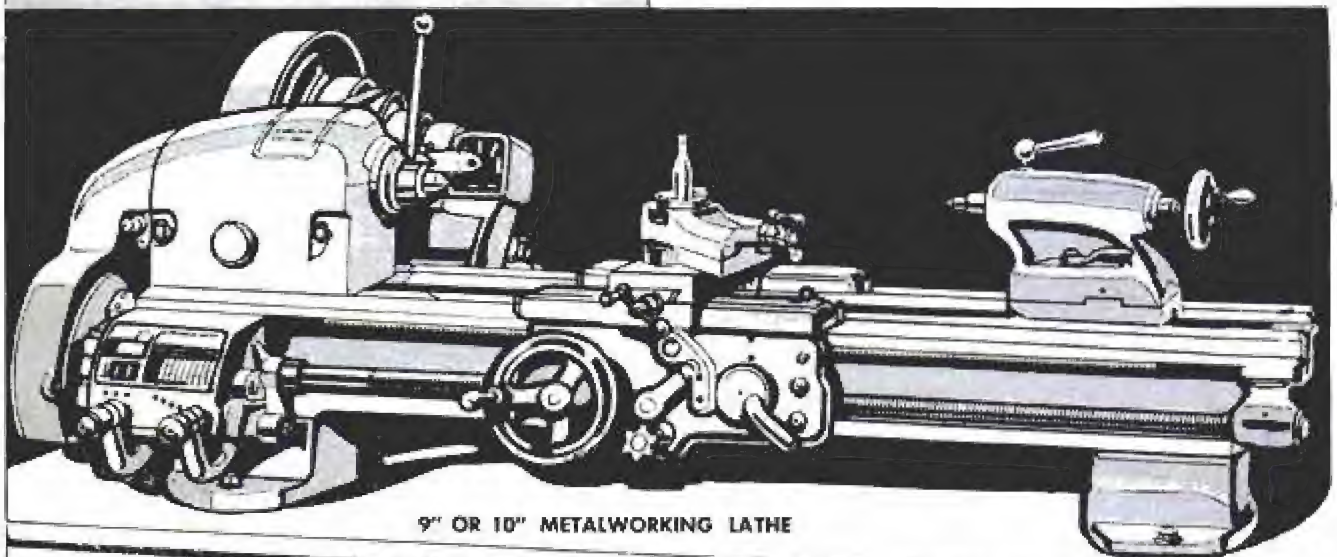


11" TO 15"
DRILL PRESS

hand-operated jigsaw and the disk sander. The former is a high-speed jigsaw, hand-held while operated, and especially good for light hobby work on thin stock. You can't beat a disk sander for rounding corners, squaring end grain and truing miters. It's fast and effective for squaring small parts. And, of course, every shop needs a grinder for sharpening tools. There are two types to choose from, the all-purpose type shown at the left and the grinder-hone on page 210.

Many craftsmen, faced with a choice of the table saw or radial saw, for space or budget reasons, would settle for the radial saw. In considering the two machines, the choice is not so much a matter of accuracy or preference; it is more a matter of adaptability of one or the other to the purpose.

A metalworking lathe with accessories available is almost a metalworking shop in itself. The power hacksaw is a timesaving tool if you have much cut-off work on metal rounds, squares and angles. Otherwise a hand hacksaw will serve. The grinder is a must in the metal shop; also, it would be difficult to get along without the drill press, either the bench type shown at the left, or the floor type shown on a preceding page. The drill press will, of course, handle both wood and metalworking jobs. The metal lathe can double as a wood lathe with the use of wood-turning centers and tool rest, but is not as effective as the standard wood lathe. ★ ★ ★

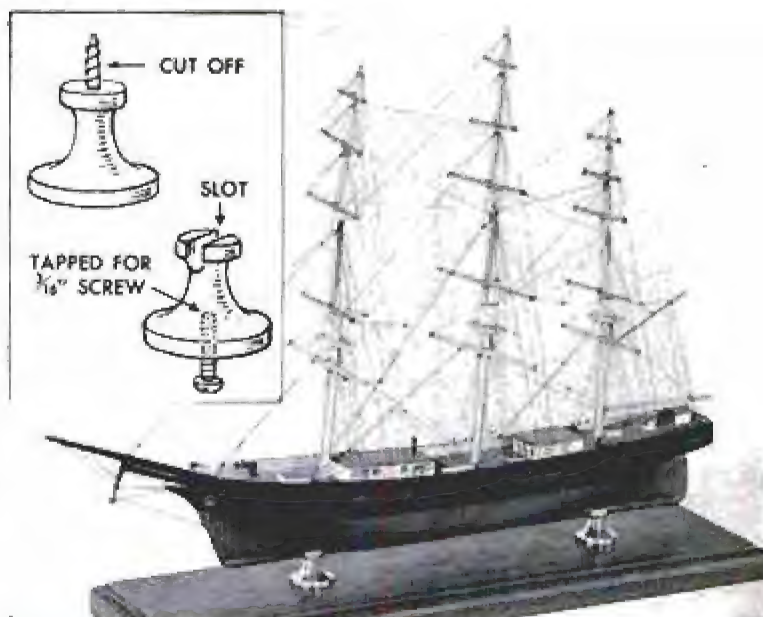


9" OR 10" METALWORKING LATHE

Ship-Model Mountings From Drawer Pulls

Give your ship model a "custom made" mounting by using brass drawer pulls of the type that have a wood screw attached. First cut off the screw, then file or saw a slot in the pull. Dimensions of the slot are determined by the size of the keel on the model. The opposite end of the pull now is drilled and tapped to accept a $\frac{3}{16}$ -in. machine screw, which is used to hold it to the mounting base. The keel of the ship is cemented into the slots.

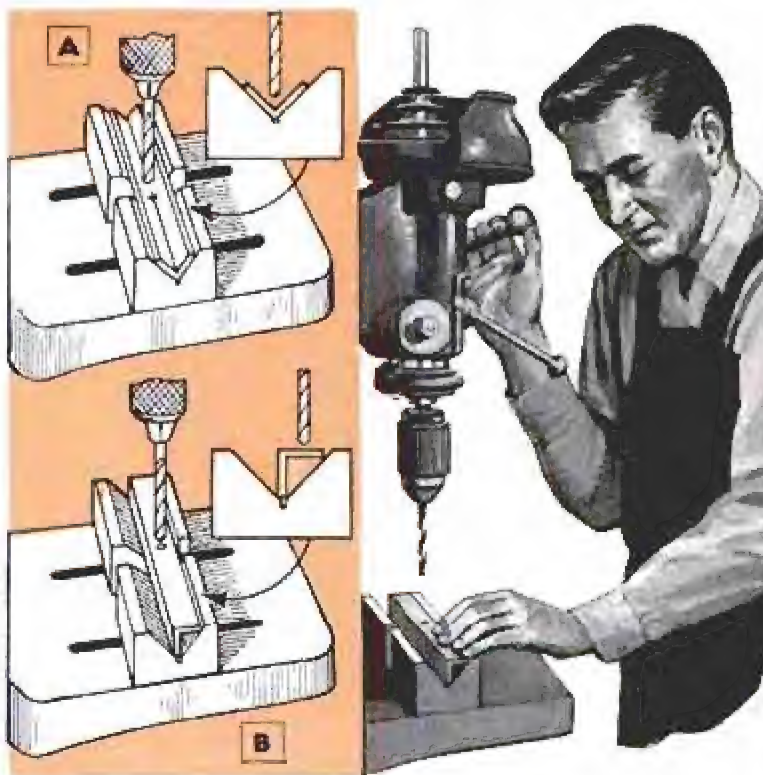
Otto Merker, Chicago.



Steel Angles Drilled With Aid of V-Blocks

If you have experienced difficulty in holding steel angle for drilling on a drill press, try using a pair of ordinary V-blocks. For drilling through the inside corner of the angle, place the angle in the V-blocks as shown in detail A. When drilling through the web, position the angle as indicated in detail B. To prevent drilling into the V-blocks, space them apart as shown so the drill will pass between them when it breaks through the angle. Clamp both V-block and angle solidly to the table of the drill press for safety. The clamps have been omitted from the illustrations for the sake of clarity, but definitely should be used.

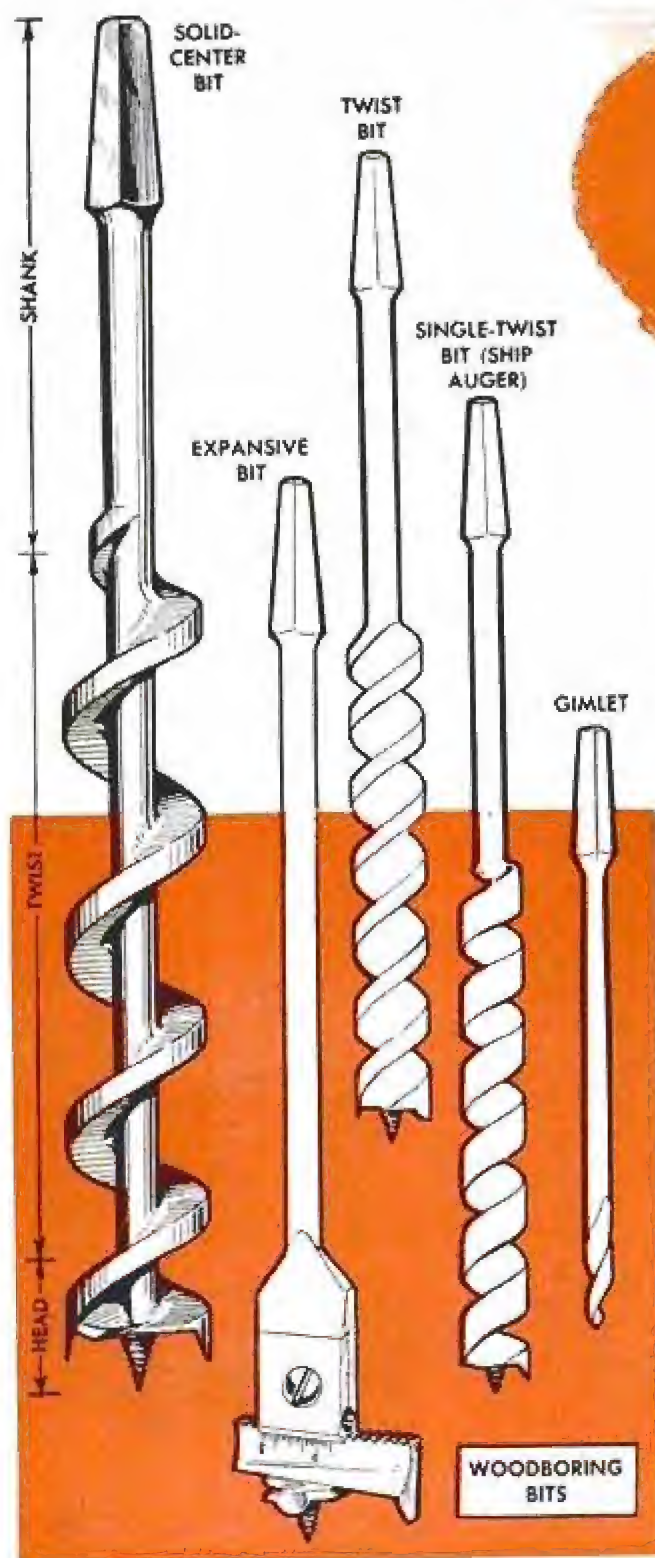
C. W. Woodson, Chicago.



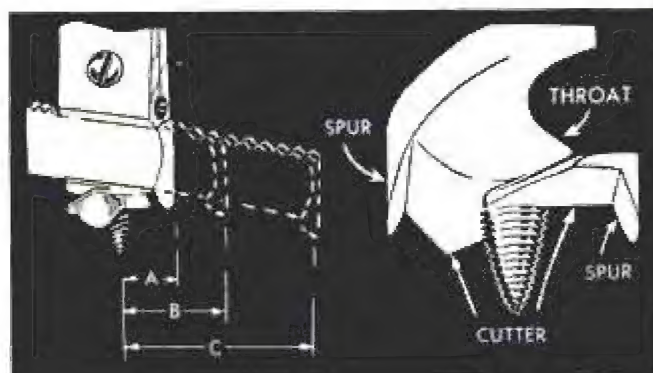
Work Supported For Saber Saw

Using a portable saber saw requires that the work to be cut is supported high enough so the saw blade stays clear of any other surface. This can be accomplished by using a piece of perforated hardboard in which are fitted a number of dowels. The dowels should project $\frac{1}{2}$ in. or more. To make "nonslip" dowels, saw off a number of inexpensive lead pencils near the eraser end. The erasers will hold the work against saw vibration and clear of the blade.





Above, common types of woodboring bits for use in a brace. Below, cutter of expansive bit is adjustable. Right-hand detail shows parts of standard auger bit.

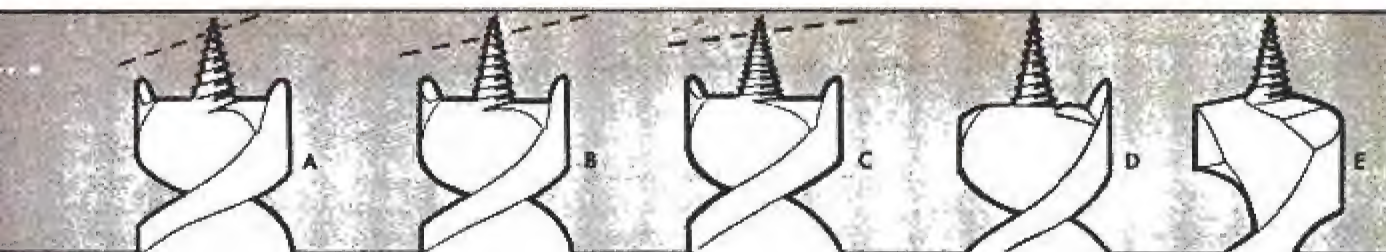


True Holes With Woodboring Bits

By C. W. Woodson

AS IT CUTS its way into wood, a woodboring, or auger, bit performs several operations simultaneously. The screw point draws the bit into the wood at a uniform rate, the spurs make a circular cut of a given diameter, the cutters lift the waste and the twist, or auger, carries the chips upward. Common woodboring bits of several types are detailed at the left. These are made with squared and tapered shanks for use in a hand brace. Solid-center and twist bits for use in a brace are regularly supplied in sets from $\frac{1}{4}$ to 1 in., rising by 16ths. The expansive bit is designed to bore shallow holes of varying diameters as at A, B and C in the lower left-hand detail. It comes in several sizes. The single-twist bit, also referred to as a single-spiral bit and ship auger, is designed for boring deep holes. A machine bit similar to the brace type pictured also is available. Gimlet bits come in sizes by 32nds, from $\frac{1}{32}$ in. up.

Power bits for use in drill presses and portable electric drills are designed for high speeds. Three common types are shown on the opposite page but there are many variations designed for special purposes. The wing-type, or spade-type, bits usually are supplied in sets, the door-lock bit is generally purchased individually. The term "door lock" more often refers to this type of bit made with a squared shank for use in a brace. When made with straight or shouldered shank it is supplied in single and multiple-spur types. The Forstner bit is made with straight shank and also with squared shank. It has a continuous lip which guides the bit and severs the wood fibers ahead of the single cutter. ★ ★ ★

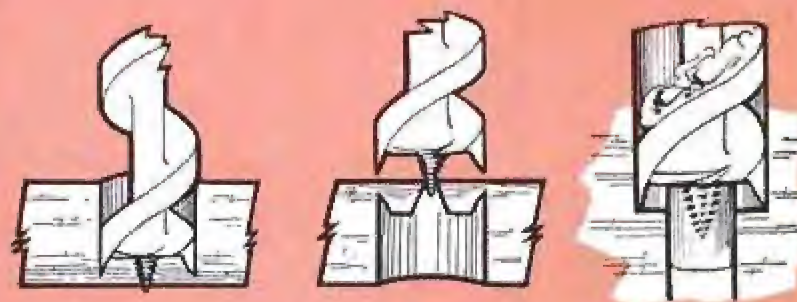


Screw point of auger bit is supplied in various pitches so that feed can be varied to suit type of work. Sharp pitch, detail A, feeds bit rapidly, makes heavy chip in soft wood. Medium-pitch screw, detail B, is used on general-purpose bits. Slow-pitch screw, detail C, feeds bit slowly, is best for use in very hard woods. Detail D shows fast-cutting bit with one spur. Detail E shows a fast-cutting bit without spurs

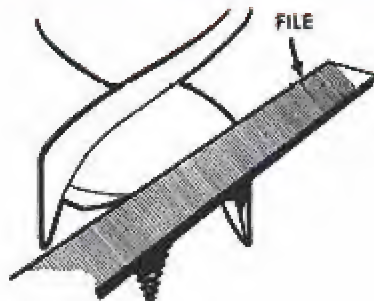
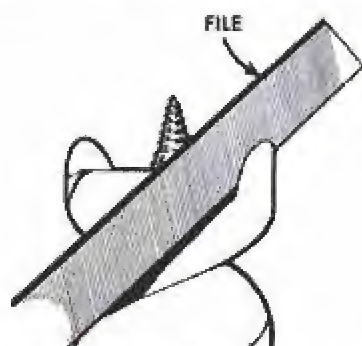
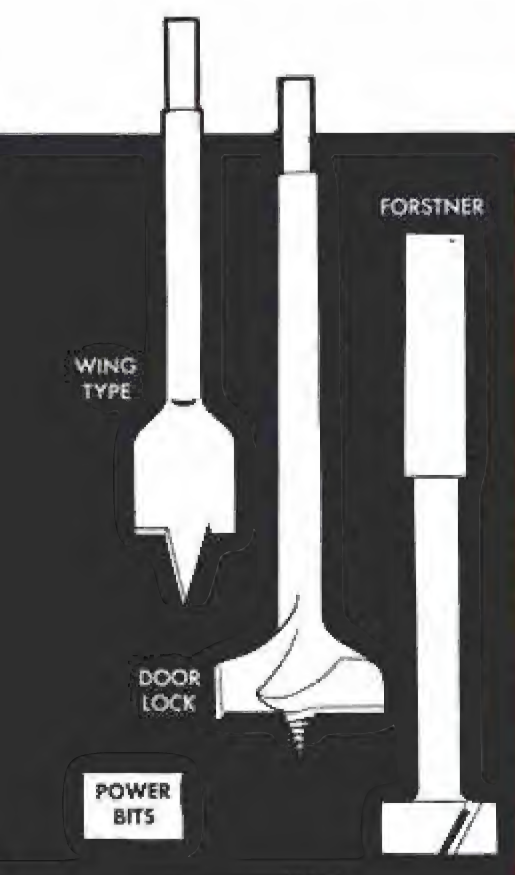
Below, typical of high-speed bits for use in drill presses and portable electric drills are the three types detailed. Forstner bit comes with 1/2-in. shank, others with 1/4-in. shanks for use in portable drills



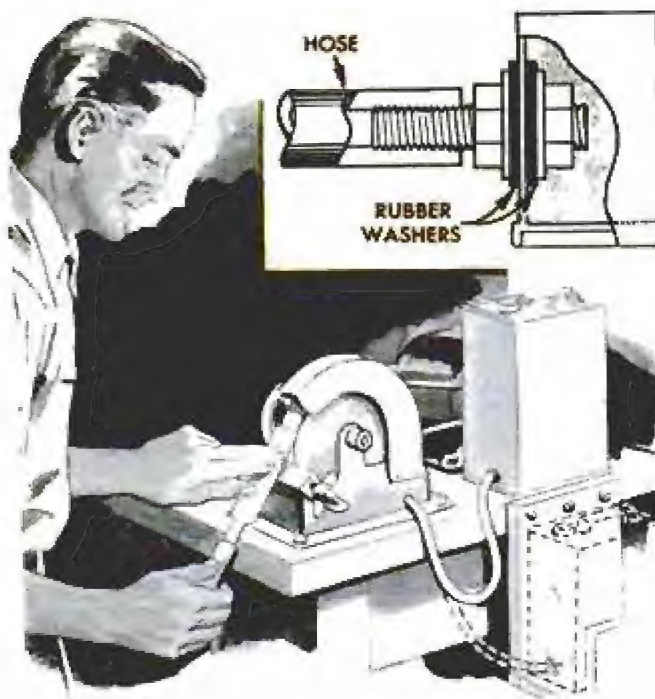
Details A, B and C above show how auger bit works. In detail A, screw pulls bit into wood. Detail B, spurs score wood to hole diameter. Detail C, lips cut and lift chips into the throat



To avoid splintering stock when bit comes through, stop boring when screw projects slightly as at left, above. Withdraw bit, invert stock and bore out waste as in center detail. In counter-boring, bore small hole through. Select short length of dowel to fit small hole and turn onto lead screw to center counterbore



Use a small single-cut file to sharpen spurs and lips of an auger bit or, better still, use an auger-bit file or a Swiss pattern file with a safe edge. Wing-type power bits can be sharpened with a small abrasive stick, or oilstone, as in right-hand detail. Auger bits in larger sizes also can be sharpened with abrasive stick



Auxiliary Tank for Grindstone Provides Handy Water Supply

For a convenient means of providing automatic filling and draining of the water reservoir on a wet grindstone, one home craftsman connected an auxiliary water tank to the reservoir as shown. When the tank is placed on top of the workbench, water flows into the reservoir through a small rubber hose, the ends of which are coupled to fittings installed on the tank and reservoir as indicated in the detail. When the tank is placed on the wooden holder screwed to the side of the workbench, the water flows back into the closed tank where it will not evaporate between times of use. Also, the grinding wheel does not become rust-stained as when water remains in the reservoir for long periods of time.

Side Door on Machine Shed Helps Store Farm Implements



Less time and effort are required when storing equipment in the large machine shed on this farm since the owner installed a 16-ft.-wide overhead garage door on one side of the building as shown in the photo. Before installing the overhead door, all machinery had to be backed into the shed through a door at one end, a difficult and time-consuming job. Now most of the equipment is trailed into the building and parked while still hitched to the tractor drawbar, permitting more compact storage of machinery and easier removal.



U-Clamp Latch Holds Double Gate Rigidly Together

To provide a simple locking device for a double gate without a center post, one farmer formed eyes on the ends of a length of steel rod and then bent it into a long U-shaped clamp that is bolted to one of the gates as shown. When swung to engage the gate opposite it, the U-clamp holds both gates rigidly together.

Emergency Ignition Repair

An old but still-serviceable ignition coil is a good spare part to have on hand when your car develops coil trouble on the road. Stored in the trunk for such an emergency, all you have to do is tape the spare coil to a support, disconnect the wires from the bad coil and connect them to the spare one.

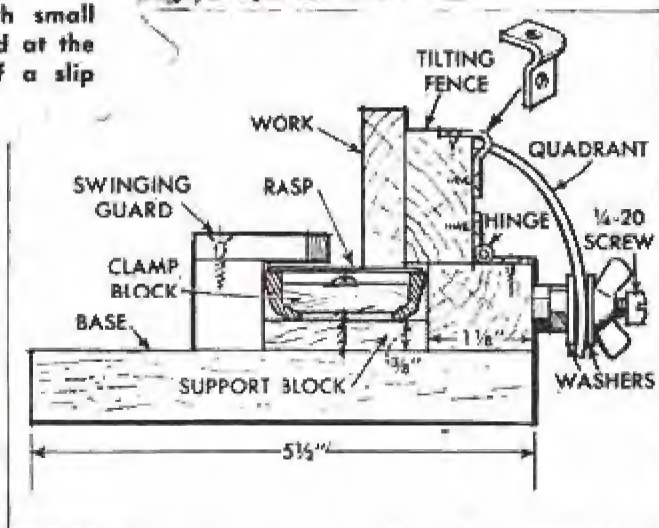
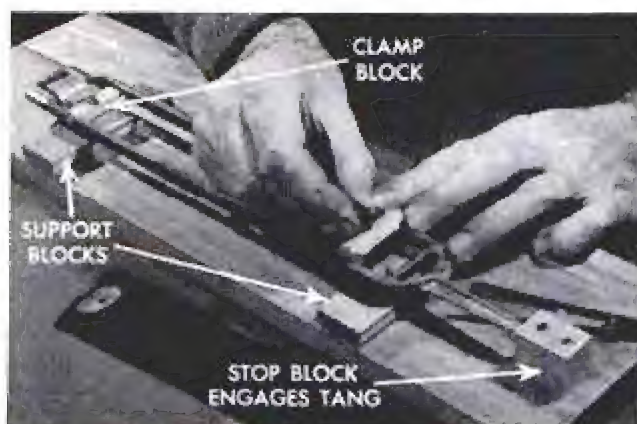
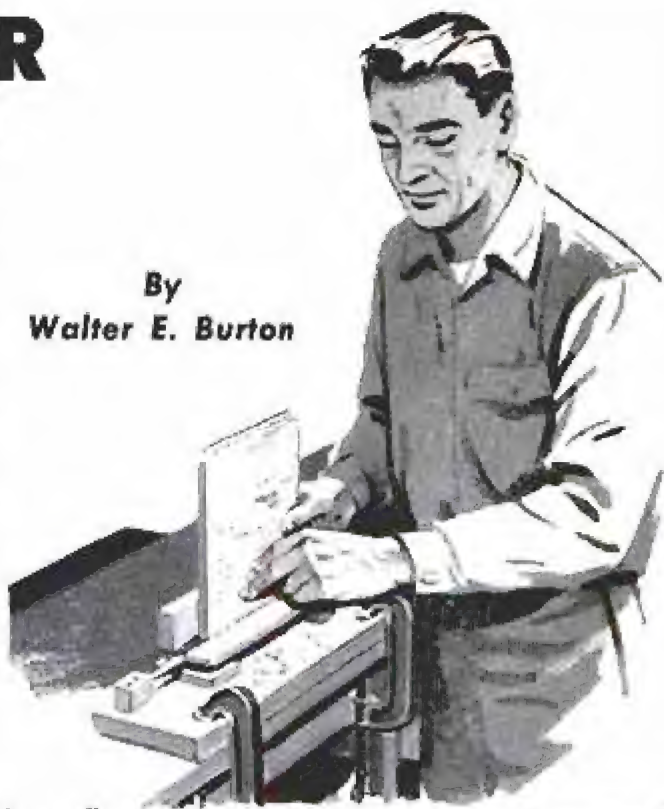
M. Robert Beasley, Jackson, Mich.

BENCH JOINTER FROM A RASP

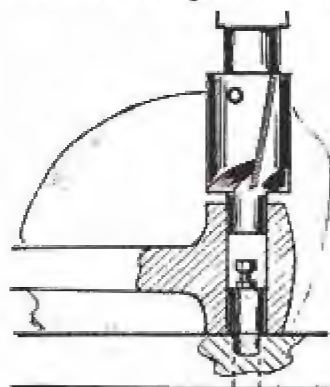
A rasp of the type known as Surform, with multiple cutting edges, can be made to serve as a handy bench jointer for edging small wooden parts. The rasp blade is removed and the frame is attached to a base as in the photo and detail below. Ordinarily, a straight fence screwed to the base with the face at 90-deg. to the rasp blade will serve the purpose, but you can add a tilting fence for beveling thin stock. Just hinge the fence at two points. The quadrant, which locks the fence at any angle, is made by bending a length of coat-hanger wire to form a U-shape, then bending the ends outward at right angles. Assemble a quadrant lock by using a 1/4-in. machine screw, a wing nut, two washers and two spacer nuts.

Metal frame of the rasp is attached to base with small blocks screwed in place. The swinging guard detailed at the right is optional. It does protect fingers in case of a slip

By
Walter E. Burton



This Adjustable Depth Stop Controls Spotfacing Cut



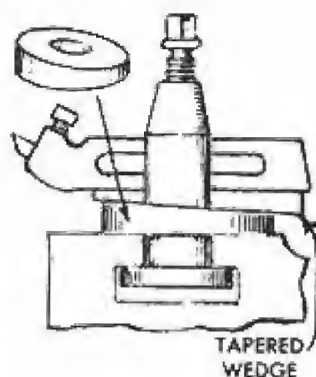
When spotfacing at both ends of a through hole it is in many instances desirable to control the depth of cut accurately. One way is to make a depth stop from a short length of round stock of the same diameter as the hole to be spot-faced. Center-drill and tap the round for a cap screw. Then the screw is adjusted so that when the pilot on the spotfacing tool engages the head of the screw, the cut will be the correct depth.

F. La Saracina, New York City.

Tapered Wedge Steadies Lathe Toolholder

This wedge-and-angle ring was developed by a machinist to correct stubborn tool chatter on a special machining job. The regular tool-post ring is replaced by a special ring having plane surfaces at an angle as indicated in the detail. The toolholder is supported on a wedge having opposite faces ground at the same angle as the surfaces of the ring. When mounted in the tool post and centered the holder is supported rigidly.

Federico Strasser, Santiago de Chile.



SHOPPING FOR TOOLS

1. MANUALLY OPERATED BENDER makes short work of bending deformed rods of the type used as concrete reinforcement. Bends rods from $\frac{1}{4}$ to $\frac{3}{4}$ in. in diameter. Can be adjusted to produce identical shapes and radii to conform to any building-code requirement
Clyde Mfg. Co., Bridgeway and Turney, Sausalito, Calif.

2. DRILL BIT is carbide-tipped for drilling hardened steels, 40 to 65 Rockwell C, without annealing, reworking and rehardening parts. Bits drill cleanly and to size, often eliminating need for reaming. Available in sizes from $\frac{1}{16}$ through $\frac{3}{4}$ inch
Chicago-Latrobe, 411 W. Ontario St., Chicago 10

3. CONTOUR SCRIBER gives a perfect fit every time when laying linoleum and tile. Scribes precise contour of wall irregularities, trim shapes and pipe diameters on the surface of linoleum or tile before placement. Has extension bar for wide adjustment
Charles Machine Co., Box 63, Springfield, N. J.

4. TUBE CUTTER includes a spare cutting wheel and reamer (inset). Cuts copper, steel and aluminum tubing from $\frac{1}{8}$ to 1 in. outside diameter. During cutting operation, tubing is backed up by two wide rollers which eliminate possibility of deforming tube
Imperial Brass Mfg. Co., 6300 W. Howard St., Chicago 31

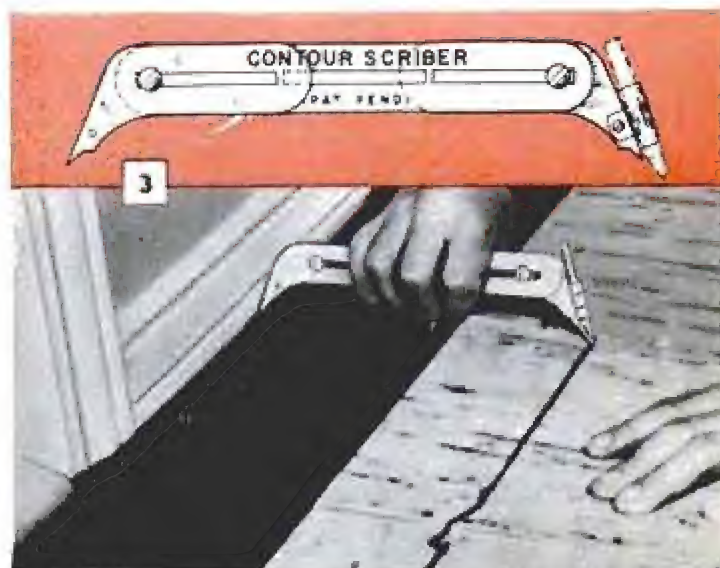
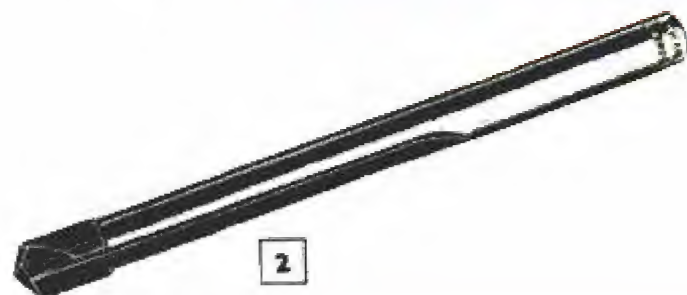
5. ADJUSTABLE MOTOR BASE takes motors up to 30 hp. Can be used with variable-speed drives as well as constant-speed drives as it has a special swinging latch to permit changes in sheave diameter. Adjusting screw tightens belts to just the right tension
The American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.

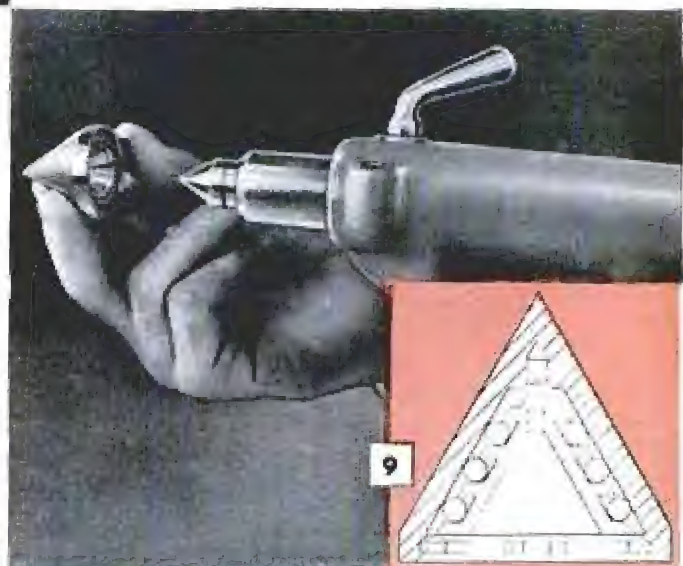
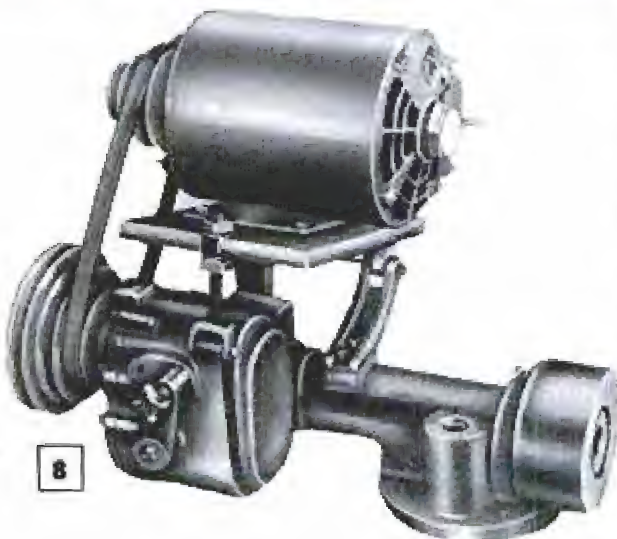
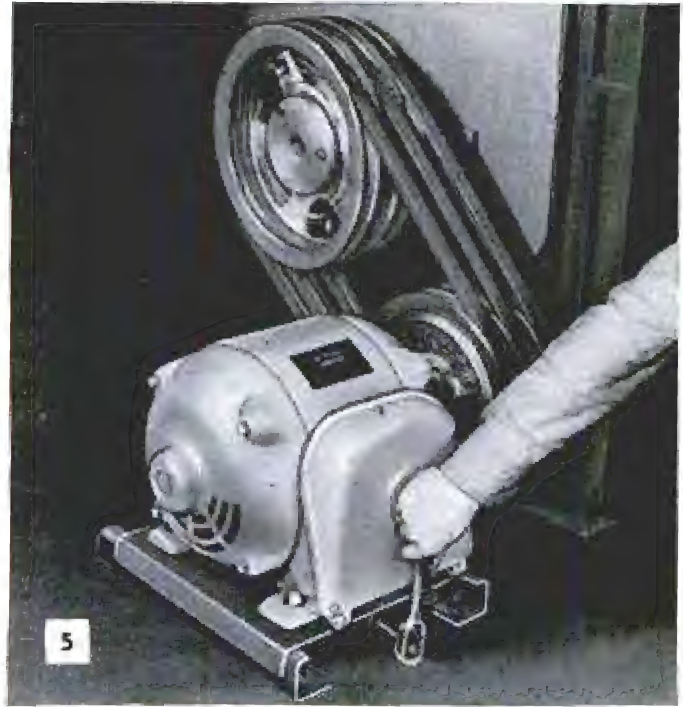
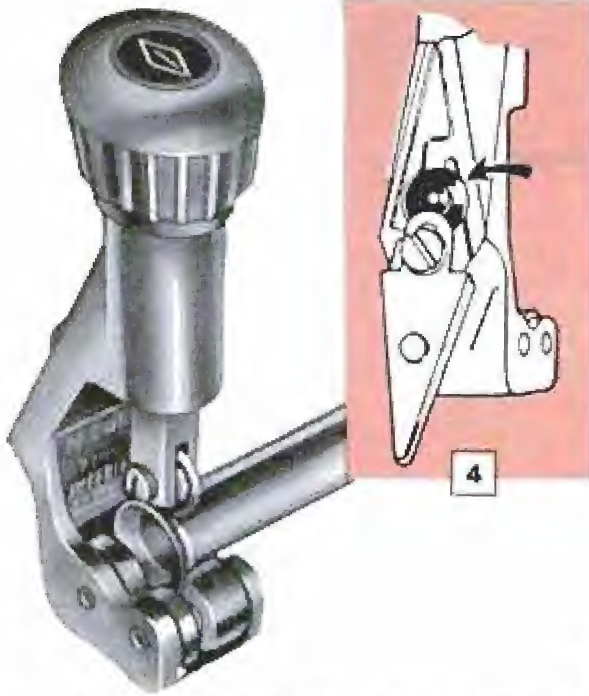
6. ALUMINUM SOLDER requires no flux or cleaning of metal. Just heat metal to soldering temperature, 500 deg. F., and apply solder to joint. Also joins copper, brass, galvanized or aluminized metals. Available in rods for home use, in bulk for industrial use
Chemalloy Electronics Corp., Gillespie Airport, Santee, Calif.

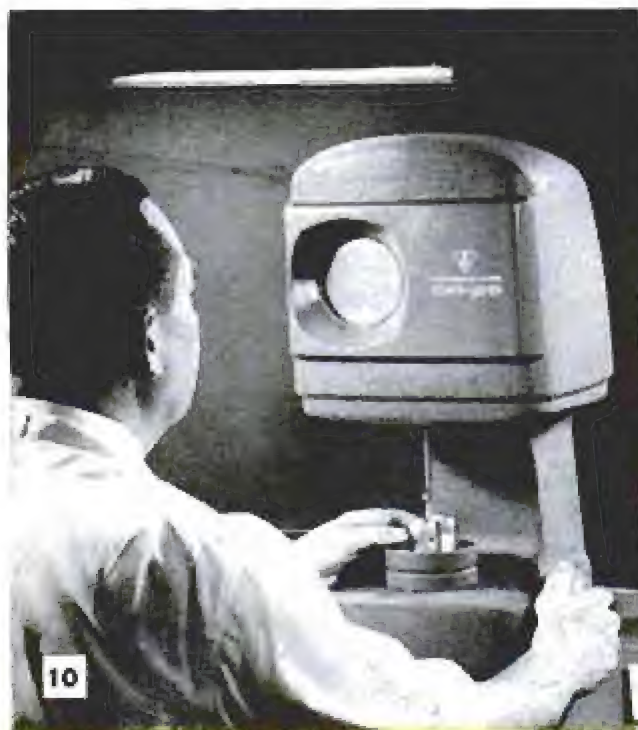
7. HEAVY-DUTY CHAIN VISE comes in two sizes to take pipe from $\frac{1}{8}$ to $2\frac{1}{2}$ in. and from $\frac{1}{8}$ to 4 in. Each vise has reversible front and back jaws with an interlocking device which prevents any misalignment
Erie Tool Works, Erie, Pa.

8. MILLING ATTACHMENT for mounting on lathes, milling machines, turret lathes, planers and boring mills has 6 speeds ranging from 200 to 900 r.p.m. Spindle height from base to center line of spindle is 2 in.
Alva Allen Industries, 1001-15 N. 3rd St., Clinton, Mo.

9. BALL-BEARING LATHE CENTER fits over the standard lathe tailstock center and rotates with work. Because rotating center is machined and ground to a close fit over the 60-deg. tailstock center it runs true, takes end and lateral thrust of the work
Stephen De Rosa, 363 Union St., Brooklyn, N. Y.
(Continued on page 220)







10. OPTICAL GAUGE that reads direct to .0001 over a 3-in. range has been made available for all-purpose inspection and quality control of small, precise parts. Measurements are read directly on illuminated, magnified scale graduated in clearly defined, least-reading intervals of .0001, with accuracy of .000025.

The Do-All Company, Des Plaines, Ill.

11. COUNTERBORE SCREW has 12-point head, turns flush into counterbored hole as in right-hand photo. This feature, plus advantages of 12-point, or double-hex, head, makes wrenching in or out easier and more positive in close quarters. Screw head is flanged so that 12-point thin-wall socket fits counterbore snugly.

The Ferry Cap & Setscrew Co., 2131 Seranton Rd., Cleveland 13, Ohio

12. SPEED CONVERTER, or speed changer, for drill press mounts entirely within drill-press head. Speed range is from 400 to 7000 r.p.m. Unit includes a balanced 4-step cone pulley, mounting brackets and hardware, locking knob and 17-in. V-belt. Included is reference sheet of speeds for various materials.

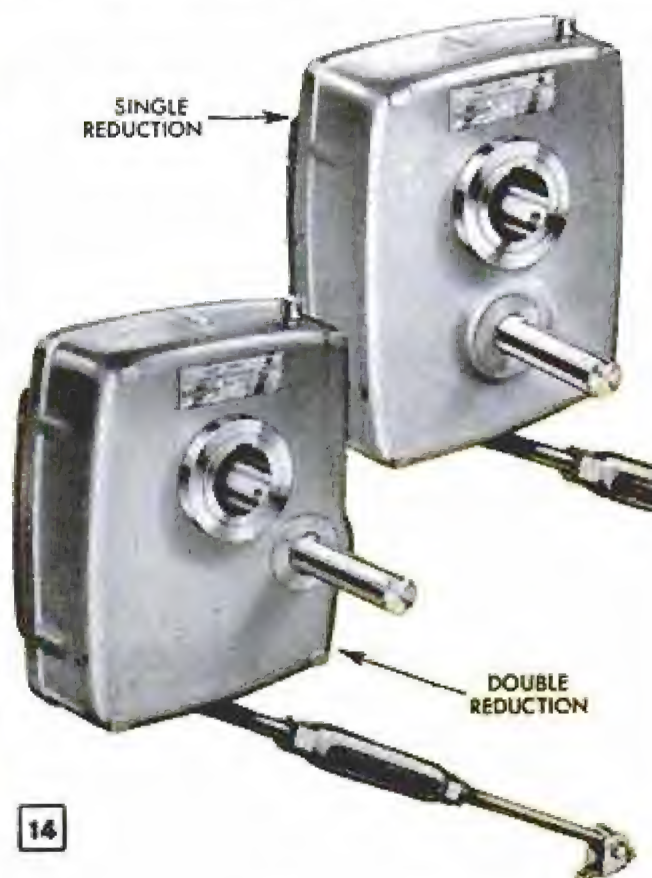
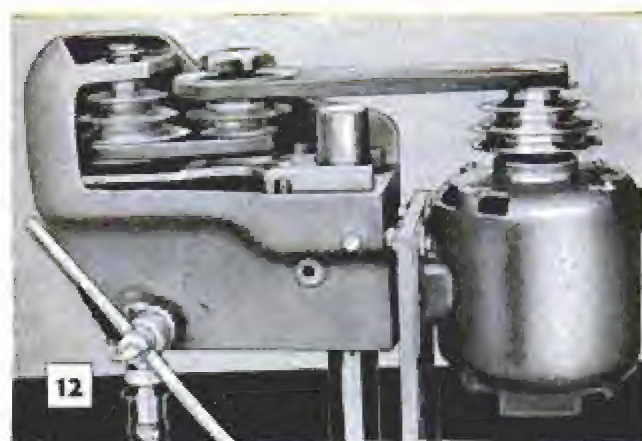
Toolcraft Corp., Plainfield St., Springfield, Mass.

13. PORTABLE MASONRY SAW cuts bricks, concrete blocks, natural stone and structural tile either dry or wet. Cutting head is adjustable to clear 8-in. materials, takes abrasive, safety or diamond blades, or disks. Head can be removed for easy, one-man handling. Motor is ½ hp. (1-hp. motor available) and is dustproof.

Robert G. Evans Co., 6024 Troost, Kansas City 10, Mo.

14. SHAFT-MOUNTED SPEED REDUCERS with rated capacities from ½ to 40 hp. are now available for maximum power-transmission efficiency in both single and double-reduction units. Automatic overload-release torque arm is built into both units to protect driven machines and motors from shock and overload.

Footo Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago



HAPPY THE HOME

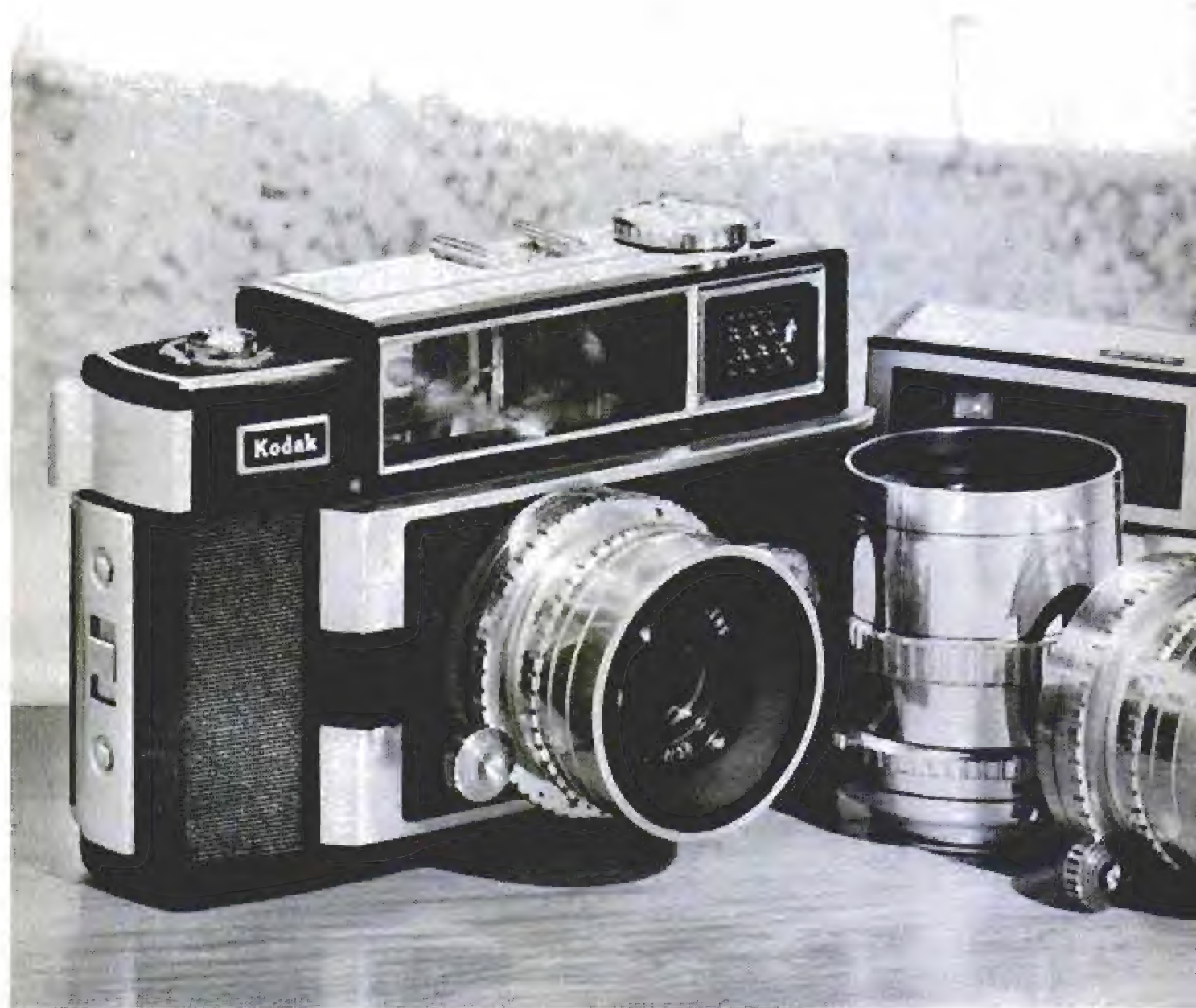
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Removing Wax

Q—The linoleum in my kitchen is old. I'd like to varnish it but have been told the wax must be removed. It's inlaid linoleum and is still in good condition but it's dull and colorless. I'd like to keep it in service for awhile, but how do I get the wax off?

—I. S., Del.

A—Are you sure the coating to be removed is wax and not varnish? Often it is rather difficult to determine with certainty by the appearance of the floor alone. So it's best to make a simple test in some inconspicuous place on the floor. Apply a few drops of turpentine to the spot selected and rub rather vigorously with a soft cloth. If the linoleum is coated with wax only, the turpentine will soften and remove the wax quite easily. It will not, however, soften varnish of the type usually used on linoleum. If the test shows the coating to be wax, then it can, of course, be removed with the turpentine, but precautions must be carefully followed through. Place a fan near an open window to remove the fumes. Open all doors and windows. If you have a gas range, shut off the pilot, or pilots, if there are more than one. Do only a small area at a time and wash with soap and warm water and wipe dry before applying turpentine to an adjacent area. When the job is finished clean with a fairly strong soap solution and wipe dry. Be sure the floor is thoroughly dry before applying the linoleum varnish. When applying the latter be sure to follow instructions in all details.



Controlling Coke Fire

Q—My hot-water heating plant is an older type and is hand fired. I burn coke and have had difficulty controlling the fire on cold, windy days. My house is full two-story with attic. The chimney is straight and is, of course, higher than average. The boiler

has regular dampers and there are check and turn dampers in the smoke pipe. What can I do to obtain better control of the fire?—W. H., Ohio

A—It's rather difficult to say with certainty without an on the spot examination of the installation. The burning rate of such fuels as coke is affected by so many variable factors that each heating installation is an individual problem. However, we would experiment with the firing routine

(Continued to page 226)

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works wonders in your home

Completely new Hand-Sander and Sander-Plane really speed through do-it-yourself projects. Each tool has a working surface of Tungsten Carbide particles permanently bonded to steel. Stays sharp for years and years. Ideal for smooth finishing of wood, plastic, wallboard, compositions or leather. Makes removal of paint or varnish easy.

On the "Perma-Grit" Hand Sander, one Tungsten Carbide sheet outlasts hundreds of paper sheets. Sands twice as fast...always ready to use when you need it. Comes in kit with fine grit sheet, but other types also available.

For sanding doors, windows, cabinets, try the "Perma-Grit" Sander-Plane with its convenient handle and front grip. Extremely handy in every workshop—files, sands, planes, shapes or notches. Removes material in half the time as it works forwards and backwards. Reversible blade for fine and coarse work.

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Flat File (Medium 80 grit one side; coarse 46 grit other side).....\$2.25

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For table and radial saws

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This "mighty midget" is a natural for a tight grip on small work in hard-to-get-at places. Only 4-1/2" long... drop forged from high grade steel. Four exclusive Channellock precision grooved jaw adjustments... capacity to 1/2". Skilled mechanics say it's one of the handiest pliers in their kits. You'll say so, too!

CHAMPION DEPARTMENT TOOL COMPANY • MEADVILLE, PA.

ASK YOUR TOOL SUPPLIER
FOR A CHANNELLOCK No. 424



Be sure it's a genuine CHANNELLOCK
Look for the trademark on the handle

(Continued from page 224)

that you have been following and we also would make a careful examination of the condition of the boiler grates and also the fit of the fire door and especially the ash door and the lower damper. If these doors do not fit tightly when closed you are almost sure to have some difficulty controlling the fire where a strong draft is present, as in a high chimney on a clear, cold day. If the grates are warped they should be replaced as otherwise it will be difficult to maintain a thin ash bed under the live coals. If the fire door and dampers are loose and the meeting edges of door and opening are rusted and pitted, replace the hinge pins and file the meeting edges square so that the doors close tightly. Then try out a variation of the firing routine with more or less fuel, different damper settings and vary the amount of ashes left on the grates. You may find it necessary to set the check damper so that it never closes entirely when the lower draft is opened.



Fall Feeding Of Lawn

Q—Neighbors and friends tell me to spread plant food on my lawn in the late fall as well as in the spring. They say that plant foods can be spread any time before the ground freezes. But it seems to me that much of this application would wash or leach away. Is there any advantage in this procedure?—N.A., Kan.

A—On the heavier soils containing considerable silt and also clay the loss is negligible, if any at all. The reason for this is that ammonia forms of the nitrogen in complete plant foods supplied for lawn application combine with the clay in the soil. This might be called a temporary combination and is due to the fact that the micro-organisms, which break down ammonia into nitrates in warm soil, are not active when the soil is cold. Because of this the soil acts as a winter storehouse for any application of plant food. This is released in the spring in a form that can be utilized by plants and grasses. Of course, on a sloping lawn you always run a small risk of the plant food being carried to a lower level by a heavy late-fall rain, but this is really the only risk of appreciable loss. Be sure to follow application instructions on the plant-food container in all details. Ordinarily you will not need another application in the early spring.

Decorating Tall Windows

Q—How does one decorate tall windows in an old home? The windows are narrow and the tops of the frames are rounded, or semicircular. Two of these windows are in pairs, the others single. I'd thought of using cafe curtains but don't know how to hang them.—R. C., Nebr.

A—We would have suggested cafe curtains, but you have already thought of them. Perhaps it would be well to try out different positions, the first position covering only the lower sash. Then try at a point higher up, covering about half the upper sash as well as the lower one. We think it likely the latter position will prove to be the best appearancewise.

Air in Water System

Q—I have a pressure water system working from a deep well. Lately I've noticed that when I open a faucet water comes out with sufficient force to splash out of the sink or lavatory. I understand that this is because of excess air in the system, but how can it be corrected and how is the supply of air regulated?—K. H., Ga.

A—All home water systems of the pressure type have some means of supplying air to the pressure tank in measured amounts, or a control unit to release air and maintain a given pressure. Usually this is handled by an air-inlet valve or by an air-volume control unit. When either of these gets out of order, the tank may fill with air or water, depending on what type of control is used. The manual which came with the system will give instructions on how to adjust the unit to give the proper amount of air. If you no longer have the manual, then it is suggested you consult with your local dealer or write direct to the manufacturer.

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Protect costly garage doors with **StanStrip***

Now . . . for less than \$3.00 . . . in less than 10 minutes . . . you can put StanStrip on an 8-foot overhead garage door. And what a difference it makes!

The thick, rubber "pad" cushions the shock of closing . . . prevents damage to doors, spares the windows, ends the crash of closing.

And, just as important, the double lips of StanStrip flex to follow every irregularity in the floor . . . seal the opening completely against dust and dirt, rain and snow. Your garage stays cleaner, drier, warmer. Your car starts easier in winter.

And does it last! You just can't hurt StanStrip. The special rubber compound was developed from hundreds of formulas tested for this purpose. Stays flexible even in coldest weather. Get StanStrip now at hardware and building supply stores.



SEAL HOUSE DOORS, TOO

Ask for DraftTite*. . . an exclusive combination of silicone-treated wool-pile fibers and aluminum. It's the most effective house-door weatherstrip on the market.

*Trademark

The Standard Products Co.
LEXINGTON, KENTUCKY

Alaska "Big Land" of Contrasts

(Continued from page 134)

\$7,000,000 worth of fuel a year. However, exploitation of Alaska's mineral wealth has lagged because of production costs in that region.

Almost everything in Alaska is expensive by standards of the "outside." Nearly all the food has to be shipped in and shipping rates are high because there is comparatively little "back haul," cargo for the return trip. As a result, a housewife may have to pay as much as a dollar a dozen for eggs and up to 50 cents for a quart of milk. Living costs in general average 27 to 56 percent higher than in an "outside" city like Seattle.

Wages are higher, too. But the Alaska Employment Security Commission does not encourage job seekers to travel to Alaska unless they have a "definite job commitment first." Some skilled workers may earn as much as seven dollars an hour in Alaska, but a recent survey showed that 12 percent of the state's labor force was unemployed. The only workers needed in Alaska, according to the commission, are certain professional and technical personnel in engineering and medicine.

In the larger cities, Alaska offers most of the comforts and conveniences of civilization. You can fly to Anchorage (which claims to have more air traffic than Los Angeles, Cleveland or Dallas) on several commercial airlines. At the airport, you can pick up your choice of new cars from a rent-a-car service. And on a drive through the business district you might find yourself in a traffic jam.

Anchorage has more than 30,000 cars on its streets. And, as in the States to the south, many of the drivers are housewives on their way to a supermarket or a beauty shop. Or they may be returning to their homes in modern apartment buildings or contemporary-styled houses topped with TV antennas.

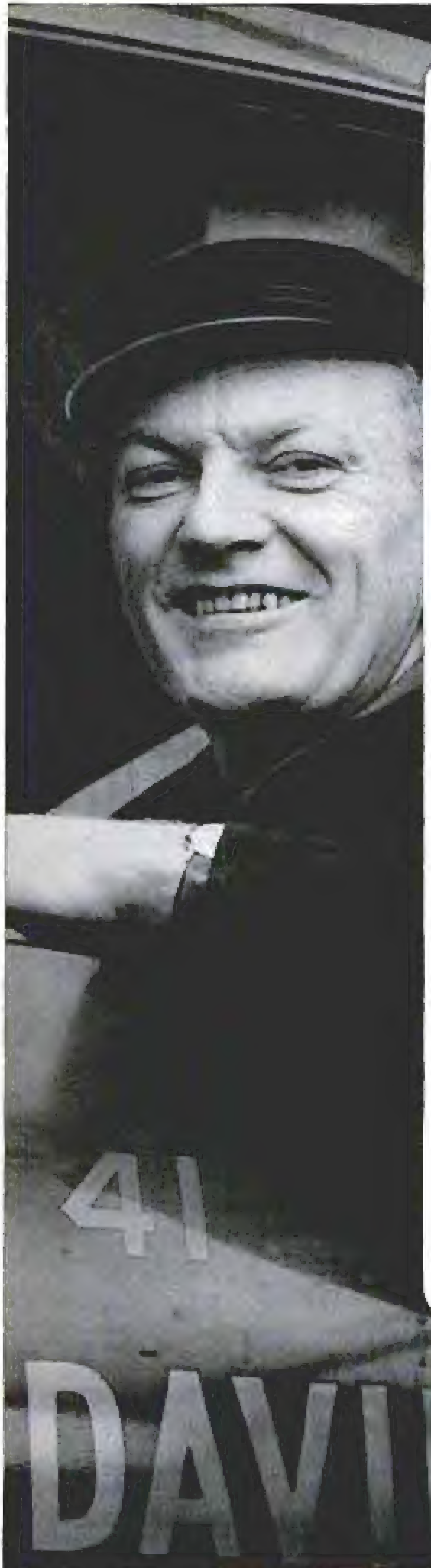
Golf at Midnight

During the summer season, local citizens may be found sun-bathing at Lake Spenard, watching a tennis tournament or playing golf. In fact, Alaska has golf courses where you can play a match at midnight.

For intellectual-type pioneers, Anchorage has a symphony orchestra, a theater workshop, a \$350,000 public library and "Great Books" discussion groups.

Education in the elementary and high schools is rated as good or better than that offered in most stateside communities. Standard achievement tests show that

(Continued to page 230)



For clean oil all the time
call for

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Hastings Oil Filter Cartridges keep oil clean *all the time*, because only Hastings has Densite filtering material.

Densite is different! Millions of selected cotton fibres—pressure packed—trap even the most microscopic dirt particles. Only Densite keeps oil clean from filter change to filter change, when replaced as normally recommended.*

Next filter change, call for Hastings—for clean oil *all the time!* Hastings Manufacturing Co., Hastings, Mich. Also makers of Piston Rings, Casite, Wear Reducer, Spark Plugs.

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with U.S. Bureau
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NEOPRENE COVERED GRIP

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PERMABOND® assembly
keeps handles tight

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Axes
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reading skill of Anchorage pupils is as much as a year and a half ahead of national averages. Alaska has its own university at Fairbanks. Community colleges are operated at Anchorage, Ketchikan and Juneau. A multimillion dollar Alaska Methodist College has been started at Anchorage.

Thriving modern cities at Alaska's northern latitudes are not unusual. By looking at a map of the world, you'll see that Ketchikan is farther south than Moscow, Glasgow, or Riga. Anchorage and Seward are about the same distance from the North Pole as Stockholm, Oslo, Leningrad, or Helsinki.

And, although Alaska has glaciers and winter temperatures of 70 below zero, all of the state isn't buried by ice and snow—even in the long dark nights of January. This newest state, if superimposed on a map of the other 48, would stretch from Northern Minnesota to Western Texas, with two "panhandles" stretching into southern California and Georgia.

As the climate of Minnesota differs from that of Texas and Georgia, so do the various sections of Alaska experience a wide range of climates. Fairbanks has recorded temperatures down to 66 degrees below zero, but in the panhandle areas the winter temperatures are no more severe than in many stateside communities above the Mason-Dixon line. Average January readings at Ketchikan, Sitka, Dutch Harbor and Atka are about 10 degrees warmer than those of the Chicago and Des Moines areas.

Summer temperatures in the 90s have been recorded in many Alaska communities. At Fort Yukon, on the Arctic Circle, the mercury once rose to 100 degrees.

Rainfall ranges from a soggy 151 inches a year at Ketchikan to a semi-arid seven inches at Fort Yukon.

Despite the weather extremes, Alaska apparently is a healthy state; it has the lowest death rate in the nation.

Homestead Farms Available

It's still possible to obtain a 160-acre farm in Alaska under the federal homestead law. But the pioneer farmer of today may find homesteading a formidable task. It takes a good-sized grubstake to establish a "quarter section" farm with modern equipment and living facilities in Alaska. When great-granddad developed his farm on the western prairies, he could get started with the tools and supplies he carried in his wagon and the animals that pulled it. To get started on an Alaska homestead, a farmer may have to buy or rent a bulldozer to clear the timber. And if he damages a couple of expensive farm

(Continued to page 232)



Thor 1/4" SpeedDrill \$22.95

With free set of 6 quality twist drills

Handles any home drilling need in metal or wood with power to spare. Much more than just a drill. This handy-sized power plant can drive all popular drill attachments—saw, sander, polisher, etc. Geared chuck and 2.5 ampere rating makes Thor model 23 SpeedDrill the best and most rugged tool in the popular price class.



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With free metal sanding sheet, never wears out

From boats to bookcases, Thor model 15R Speed-Sander takes the backbreaking work out of refinishing. Smooth orbital action and light weight lets you tape sand and smooth rough plastering with ease. Thor versatility and performance have made it the world's largest selling orbital sander. Thousands in daily professional refinishing use.

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Thor Jig Saw \$29.95 With free set of 4 jig saw blades

Thor's Jig Saw is the tool which can turn the "do-it-yourselfer" into an artisan. Will make fancy scroll cuts and angle cuts with ease. Handles up to 2" wood... tilts both sides to full 45° cuts. Thor model 440 Jig Saw will be your workshop's handiest and most versatile tool. It's the newest and best of its type on the market.

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Greatest improvement in the history of bolt action rifles. Greater safety for shooter—better protection for mechanism from damage and dirt—more graceful streamlining.

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machines on hidden roots or rocks, he may be out of business before his first crop is harvested.

Nevertheless, there is farm land available in Alaska and the state hopes eventually to produce half the food it needs. The growing season around Juneau, Ketchikan and Wrangell is as long as in much of the Midwest. Farther north, there are fewer frost-free days but, since the summer days are long, farmers are able to grow fabulous vegetable crops. Corn, tomatoes and tree fruits are about the only crops that will not mature in the short season.

The Federal government also will sell for as little as \$2.50 an acre small tracts and homesites to persons who want to establish a resort, fur farm, poultry ranch or filling station.

Whether an Alaskan is watching a television show in Fairbanks, playing golf in Anchorage or milking cows on a Matanuska Valley farm, he cannot escape the frontier atmosphere. He may see parka-clad Eskimos in the city stores, kayaks skimming past moored seaplanes or totem poles behind radio towers. And he is always a short drive and a hike away from a wonderland of hunting and fishing.

Alaska Game Records

Sportsmen who have lingered for hours over lines in the fished-out lakes of the older states would be startled by the catches Alaskans tote home from nearby streams—12-pound silver salmon, 16-pound rainbow trout and Chinook salmon that would crowd a home freezer.

A short trip from Anchorage puts the hunter within gunsight of moose, caribou, deer, bear, mountain goat and white Dall sheep. Inland game birds available include ptarmigan (20-per-day limit) and spruce hen. Mallard, teal and black brant inhabit the coastal waters and lakes.

The federally owned Alaska Railroad takes parties of hunters and fishermen on the morning run from Anchorage and drops them off near their favorite spots. The sportsmen bag their bear or land their trout and return to the tracks in time to flag down the afternoon train returning from Fairbanks.

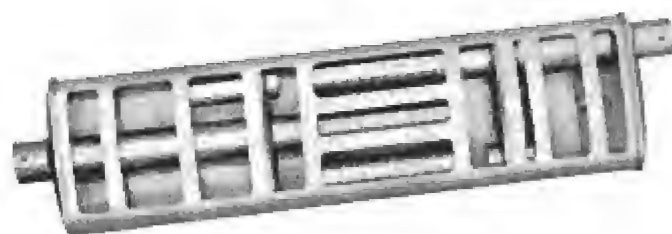
Hunters also make frequent use of the services of bush pilots for air trips to remote areas where they can shoot Canadian and snow geese, or perhaps polar bear. At least one airborne guide guarantees that his client will return with a pelt.

And Alaska has game to match its size. Record grizzly and brown-bear pelts are in the neighborhood of 11 feet in width. One bull moose had 25-point antlers with a

(Continued to page 234)

NOW! A NEW MUFFLER WITH TWICE THE LIFE!

The new MoPar Sono 4-X muffler uses an advanced design to give you up to 100% longer life. This new MoPar muffler, engineered by Chrysler Corporation, gives you outstanding muffler performance and long-lasting safety; with real economy.



There are five major causes of muffler trouble—and here are the steps Chrysler Corporation engineers have taken to combat them in the MoPar Sono 4-X:

Internal muffler corrosion: A car's engine manufactures about a gallon of water for every gallon of gasoline burned. This water contains enough sulphuric and other acids to quickly corrode the material of an ordinary muffler. The new MoPar Sono 4-X muffler combats this corrosion by means of galvanizing—from the head and shell to the outer wrap.

Internal muffler temperature variations: These are rough on a muffler because water containing diluted acid accumulates in "cold spots," allowing it to corrode muffler metal. The new MoPar Sono 4-X is specifically designed to *maintain a uniform temperature throughout*, allowing this water to vaporize and be blown out the exhaust.

Engine backfire: Fuel vapor explosions can rip the body seams and tear off the heads of ordinary mufflers. The MoPar Sono 4-X

guards against this danger by means of heads that are spun or rolled into the shell—giving strong, gas-tight interlocking of the shell and head material.

Road shock: The constant flexing of a muffler head and neck during rough driving leads to metal fatigue in ordinary mufflers. In the MoPar Sono 4-X galvanized heads, shell and outer wrap, plus double-locked seam joints, assure *highest resistance* to metal wear.

External damage: Contact with high road centers, rocks, ice, snow, salt, water, curbs and ramps is the reason many mufflers wear rapidly from the outside. The *extra sturdiness* and balanced construction of the MoPar Sono 4-X offer the greatest resistance to external damage yet devised in the industry.

To get the *most advanced muffler* made today, see your Plymouth, Dodge, DeSoto, Chrysler or Imperial dealer, or leading independent repair shop featuring MoPar products. He has the *MoPar Sono 4-X* in stock now—at competitive muffler prices!

Genuine Chrysler-engineered

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New extra-fast cutting **RIGID** No. 315 Tubing Cutter



Compact and light, yet strong, this new No. 315 **RIGID** 3-Wheel Tubing Cutter is extra handy for home use. Just what you need for that hard-to-get-at tubing. No skinned knuckles...no slow hack saw. Cuts copper, brass, aluminum, steel tubing and thin-wall conduit. Handy **RIGID** fold-in reamer protects hands and pockets. Try the new **RIGID** No. 315 and you'll wonder how you got along without it. See and buy it at your Hardware Dealer's.

The Ridge Tool Company • Hyacin, Ohio, U.S.A.

spread of over six feet. Fishing records include a rainbow trout nearly 35 inches long.

Besides providing recreation and food for Alaskans, the state's fish and wildlife are important sources of income. Fishing is the biggest industry and fur is the third largest source of income, behind mining. Nearly 25,000 people work in Alaska's 100 commercial fisheries which annually produce millions of cases of canned salmon, plus herring, halibut, sablefish, shrimp, crabs and oysters.

Fur Farms Favor Fish

The abundant fish supply also helps support Alaska's fur industry. The state has many licensed fur farmers who raise mink, blue fox and silver fox in captivity. (The Department of Interior suggests there is plenty of room for expansion of this type of enterprise in Alaska.) Fish is a basic food for fur-farm animals and it can be obtained cheaply in southeastern and coastal areas of the state.

Extensive timber resources can support future wood products, pulp and paper industries. The Tongass National Forest alone has over 78,000,000,000 feet of timber, mostly hemlock and spruce. There are forests of birch and other hardwoods in other parts of the state. A \$5,000,000 pulp mill recently was established at Ketchikan.

Hydroelectric dams may eventually beef up Alaskan industries. A Bureau of Reclamation survey of about two-thirds of the state's 580,000 square miles showed there are about 200 likely spots for hydroelectric plants. It has been estimated that Alaska's vast water-power resources could be used to make 50,000,000,000 kilowatt hours of electricity—about three and a half times the annual output of Grand Coulee Dam.

Updating the Data

Besides adding a star to the U. S. flag, the admission of Alaska as a state has required hundreds of changes in various almanacs and encyclopedias. The nation's population and land area figures must be updated to include Alaska. The center of population moves from Kansas to South Dakota; Texas becomes the second largest state and Nevada moves one notch up the population scale, outranking Alaska by about 40,000. Alaska also replaces Nevada as the state with the fewest persons per square mile. And The Union now includes a state which is west of Canada, extends above the Arctic Circle, and is closer to Russia than it is to its neighbor states. In becoming a state, Alaska adds tin mines, volcanoes, the highest mountain in North America (20,320-foot Mount McKinley),

(Continued to page 236)

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This is not just an ordinary "no down payment" offer. We actually pay your complete down payment for you (on approved credit) up to 10% of the suggested retail price.

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Take advantage of this amazing "Name-Your-Deal" offer—now—at your leading hardware or department store, lumber yard or Montgomery Ward. *Special offer:* Write today for your free copy of the informative booklet, "What to Look For When You Buy Power Tools," to: Yuba Power Products, Inc., Dept. 200-M, 800 Evans Street, Cincinnati 14, Ohio.

\$179⁰⁰

suggested retail price

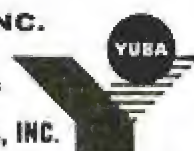
All-metal bench \$19.95—½ h.p. motor \$34.95
¾ h.p. motor \$46.95



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YARDSMITH POWER MOWERS AND TILLERS

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glaciers, rivers, Indian tribes, and a mass of new wildlife and weather data to any information file about the United States.

Like its sister states, Alaska's geography is marked by names that spell out the history of the region. The name of Alaska, itself, is from the Aleut language and means "The Great Land." Chicagof, Baranof and Andreafsky are as Russian in origin as the onion-shaped church steeples in the Aleutian Islands. Prince William Sound and Prince of Wales Island show British influence while such places as El Capitan, Cordova and Valdez are tokens of Spanish conquests. Crooked Creek, Dime Landing, Fishhook, Cold Foot and Purgatory are reminders of the Gold Rush era.

Flour Strike in a Chuck?

The language of Alaskans also shows the influence of the Klondike period. If a miner talks about "flour," for example, he may be referring to gold dust rather than cake recipes. "Hi yu" is not a greeting but a Chinook expression meaning "plenty." A "strike" is an ore discovery and a "chuck" is a stream. A "mukluk" is something you wear on your feet but "muckamuck" is something you eat. And "mush" is a command to a dog team.

It's been a long haul for Alaska from the days when Russians who didn't want the

land finally unloaded it on Americans who were almost equally unenthusiastic about the deal. For 45 years of its "poor relative" history it didn't even rate a territorial status. When statehood was first proposed, in 1916, even Alaskans laughed at the proposal. After World War II, however, the campaign finally gained enough momentum to clear the Congressional hurdle. But Alaska statehood supporters had a constant symbol of encouragement: The state flower is the forget-me-not. ★ ★ ★

Small Artificial Heart Fits Inside Body

Weighing three pounds and operated by a tiny alternating-current motor, a newly developed blood pump can be placed in the body of an animal as a substitute for the heart. The pump and motor are enclosed in a plastic case, with a single wire connection leading outside the body. Dr. B. J. Kuserow of Yale University adds that the pump can be adjusted from 40 to 180 "heartbeats" per minute by changing the voltage.

ⒸBerkelium, a re-created element that probably existed when the universe was formed but died soon after creation, has been isolated in quantities which are large enough to see and to weigh.

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ALL-NEW TWO-SPEED 2.8 AMP. 3/8" DRILL

FEATURES: powerful 2.8 amp. universal AC/DC fan-cooled motor • electro-mechanical transmission changes speed instantly, electrically • interlocking speed range selector switch • precision geared chuck and key • spindle lock for easy chuck removal • multiple ball thrust bearing • weighs under 6 lbs., perfectly balanced • silver luster finish

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THE RIGHT SPEED FOR EVERY DRILLING JOB

AND YOUR SANDING, POLISHING, SAWING ATTACHMENTS

AT THE FLICK OF A SWITCH!

Here's the world's most revolutionary new drill... the drill that will handle every drilling job! Two separate speed ranges! 2000 rpm for drilling wood, plaster, plastic, and other "light" materials, and 1000 rpm for heavy-duty drilling applications. To change speeds instantly, you merely touch the interlocking electro-mechanical speed range selector switch. And, both speed ranges develop full power for fast, efficient drilling under any conditions!



\$32⁹⁵

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—He has your plans waiting for you now, free plans for all Masonite's Christmas figures. And he has just what you need to bring them to life: Masonite exterior panels. These panels are super-smooth and splinter-free. They cut cleanly, stand firmly. What's more, they're all prime-coated, ready to take on their gay Christmas colors...ready for years of holiday service.

How they'll add to your Christmas spirit —this year and many years to come. These durable Masonite panels take to wintry weather like Santa himself! So act now! Get down to your lumber dealer's...ask him about the full-size tracing patterns for your displays...he'll help you with your plans and materials. Or send the coupon below for complete information.

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Insist on Masonite
¾" Primecote
Panels for your
Christmas cut-outs.
They're so easy
to paint...so
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Please send me my free Christmas plans and full
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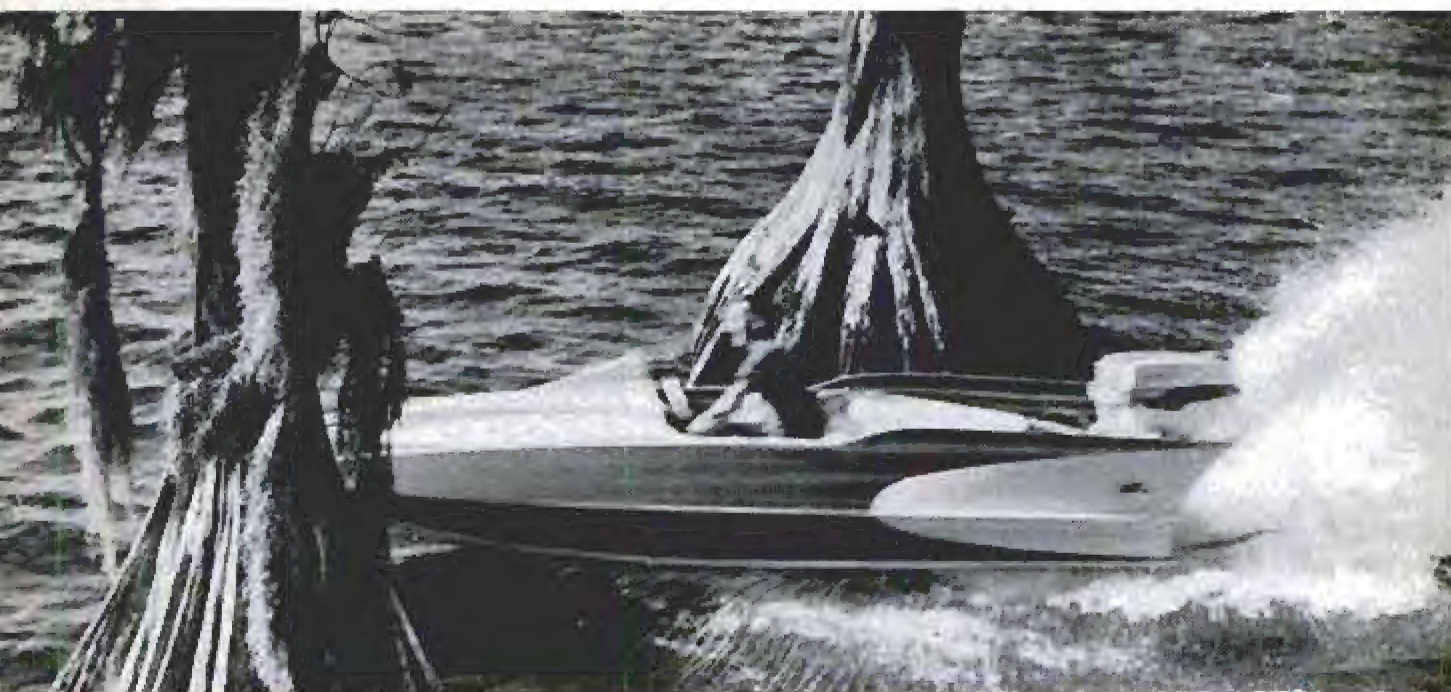


Car makers—over *twice* as many car makers (including Rolls-Royce) specify Champion spark plugs—thirty-six different makes in all!



Airlines—*all* of the world's major airlines use Champion spark plugs for the safe, dependable performance the airlines *must* have at any cost!

Q. Why is it that wherever performance is vital—on land, sea or in the air—the experts choose Champion spark plugs?



Outboard engines—*all* the major U. S. manufacturers of outboard engines use Champions for easier, dependable starts, smoother performance.



Racing cars—8 out of the last 9 Indianapolis winners used Champions. And 9 out of 10 *stock* car winners over the past 5 years used Champions!

A. The experts know from experience that you can always depend on Champions. To get the best performance from your car, put in a new set of Champions every 10,000 miles!

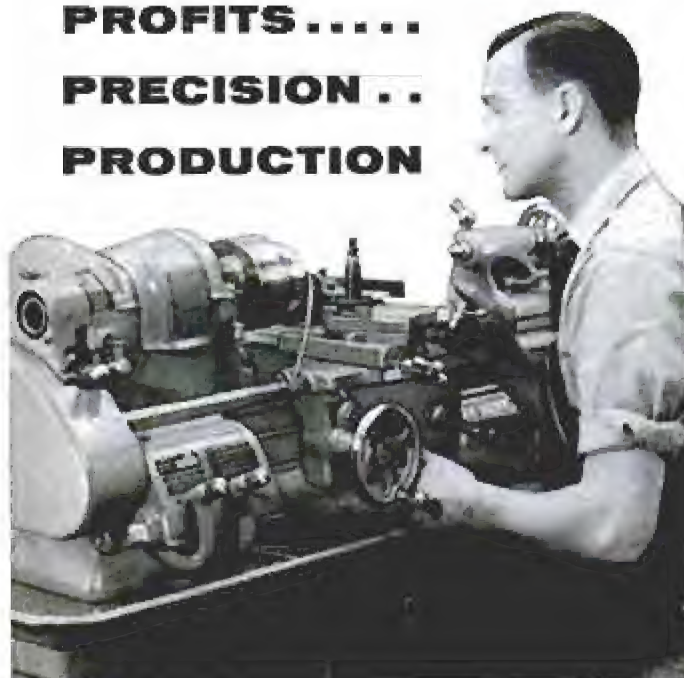


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PROFITS.....
PRECISION..
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BENCH LATHES-9", 10-K and 10" sizes in independent change gear, quick change gear and toolroom models.

FLOOR LATHES-9", 10-K, 10", 13", 14½", 16" and 16-24" sizes in quick change gear and toolroom models—129" maximum between centers on 16" lathes.

TURRET LATHES-10", 13" and 16" sizes with 1-1/16" collet capacities.

MILLING MACHINE-Vertical spindle type with universal 360° swivel head.

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PEDESTAL GRINDERS-8" and 10" wheel sizes. More room for work and for hands.



WRITE FOR CATALOG

Fully describes and illustrates all the features of the above machines plus many tools, attachments and accessories.

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA
Building Better Tools Since 1906



Up to 24
months to pay.

High-Fidelity Stereo Amplifier

(Continued from page 160)

be evaluated from its electrical characteristics and, within the scope of its intended operation, this amplifier leaves little to be desired.

The performance curves and specifications table tell the story at a glance. At its rated power output of 10 watts, each amplifier section has *less than 1% total harmonic distortion over a range from 30 to 14,000 c.p.s.* This assures 20 watts of virtually undistorted power—more than enough for practically any application around the home.

A flat frequency response (within ± 1 db) over the entire audio spectrum, sufficient sensitivity for full power output with any ceramic or crystal stereo cartridge or radio tuner, and an inherent hum and noise level below normal audibility round out the details.

Construction

A 7 x 13 x 2-in. chassis, either steel or heavy-gauge aluminum, will conveniently house all the parts for this stereo amplifier. Placement of chassis-mounted components is shown in the title photograph and in the pictorial diagram. The parts themselves can be used as templates to determine the exact dimensions and positions of the necessary cutouts.

After installing the chassis-mounted parts, solder the heavy bus wire in place. This is grounded to the chassis at the input jacks and terminated at the upright electrolytic capacitors. These should be insulated from the chassis by means of their fiber wafers.

The rest of the wiring, although somewhat crowded in the vicinity of the controls, should present no problems. Start at the input jacks and work toward the power supply, making sure that each wire and part is well soldered to its proper connecting point. Follow the pictorial wiring diagram and use the schematic diagram to check your work after all wiring is finished.

Resistor R22 consists of two separate resistors connected in parallel. In the pictorial, the individual resistors of each parallel combination are labeled "½ R22," to avoid confusion.

A metal bottom plate should be used to cover the bottom of the chassis after all wiring has been completed and thoroughly checked. The bottom plate reduces hum pickup and prevents contact with dangerously high voltages appearing inside the chassis when the amplifier is turned on.

(Continued to page 242)



McKean Blue Jay



Wagemaker Wolverine 17-foot Catalina



Lyman 19-foot Clinker-built Runabout



Chris-Craft Boat Kit

Make this a family boating Christmas

GIVE A BOAT OR BOAT KIT

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Weldwood Royal Marine Plywood. Expressly engineered to exceed the requirements of today's high-speed boats, Weldwood Royal Marine Plywood assures you of top boating enjoyment because it resists impact, withstands rot and fungus, cuts maintenance problems, finishes beautifully, and is guaranteed never to delaminate.



For top family boating fun, visit your boat dealer's before Christmas and select a boat or kit that displays the Weldwood Royal Marine Plywood label.

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BETTER BUY TWO!**

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Minnesota Mining & Mfg. Co.
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for your son's Christmas**

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Easy to build! Fun to drive! Our detailed plans make it easy to assemble in a few hours. Drives like a real car . . . push it or add power . . . any gasoline motor up to 2½ hp. Strong wood chassis, steel undercarriage, 10" rubber wheels, full 66" long, 17" wide . . . will hold up to 175 lb. driver.

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All prices F.O.B. Fairport
Illustrated Brochure on request.
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The amplifier should be turned on only after your loudspeakers have been connected to the terminal strips. Either 4, 8 or 16-ohm speakers may be used, but the phase reversal switch, S4, is wired, as shown, for a 16-ohm speaker. For an 8-ohm speaker, the wire from the junction of R16, C8 and the 16-ohm lead of T1 is connected directly to the 16-ohm terminal rather than S4 and the wire from S4 to the 16-ohm terminal is run, instead, to the 8-ohm terminal. The 8-ohm transformer lead is then soldered to the open lug of S4. Corresponding wiring changes must be made if a 4-ohm speaker is to be used.

Possible Modifications

As it stands, this amplifier was designed to handle the requirements of two radio tuners and a crystal or ceramic stereo phono cartridge. With the function switch, S1, in the CER. PHONO position, the input resistance to both channels is 2.7 megohms, the value of R2. While this value will generally provide good results with all cartridges of this type, manufacturers of some cartridges may specify other resistance values, or even a simple R-C network, for optimum performance. In such cases, R2 should be changed to conform with the manufacturer's recommendations.

Many high-fidelity enthusiasts prefer magnetic phono cartridges to crystal or ceramic units. This amplifier has neither the required gain nor the equalization needed for these low-output cartridges. It is a simple matter, however, to add a stereo preamplifier, or two inexpensive monaural units between the magnetic cartridge outputs and the CER. PHONO inputs of the amplifier. If this is done, the value of R2 should be changed to approximately 1 megohm. The preamplifiers need have no volume or tone controls because these functions are available in the main amplifier.

Now, if you already have a monaural hi-fi system but are planning to convert to stereo, the idea of retiring a perfectly good monaural amplifier in favor of a stereo unit just doesn't make sense. Furthermore, it isn't necessary. What you need is another single-channel amplifier, plus the switching provisions for stereo flexibility. In such a case, you can still build this amplifier, but you can save almost 50% of its construction cost.

Obviously, the B channel of the amplifier will not be needed and you can immediately omit V3, V6 and V7, plus all the associated circuit parts. V1 will still be needed, but no connections need be made to the second triode elements. In addition, the recommended power trans-

(Continued to page 244)

CRAFTSMAN KROMEDGE

taps and dies last longer...

cut cleaner threads easier



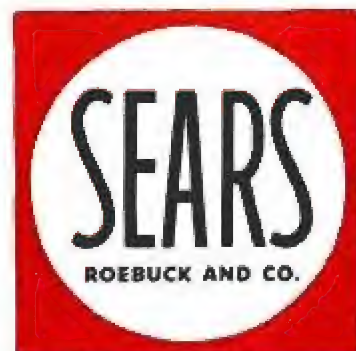
sale! \$28.50 40-piece set **\$19.88**

Exclusive at Sears! Jewel-like hard chrome puts an edge on these tools that lasts 3 to 5 times longer than ordinary edges. You always get a cleaner, sharper thread cut with far less effort. 40-piece 17-cut set has up to 1/2 inch capacity and comes complete in a rugged plastic case that's unbelievably compact—takes 50% less room than wooden cases, weighs 5 pounds less! Buy now and save nearly a third! Only \$2 down on Sears Easy Payment Plan.

Cuts National Coarse (USS) threads 1/4-20, 5/8-18, 3/8-16, 7/8-14, 1/2-13; National Fine (SAE) 1/4-28, 5/8-24, 3/8-24, 7/8-20, 1/2-20; machine screw, 4-36, 6-32, 8-32, 10-24, 10-32, 12-24; and 1/8 in. standard pipe threads. 16 adjustable 1" dies; 1 solid pipe die, adjustable guide die stock, tap-and-reamer wrench, "T" tap wrench, screw pitch gauge and screwdriver. Case has two removable trays.

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former can be replaced with one having a 120-ma. high-voltage rating for a further, substantial cost reduction.

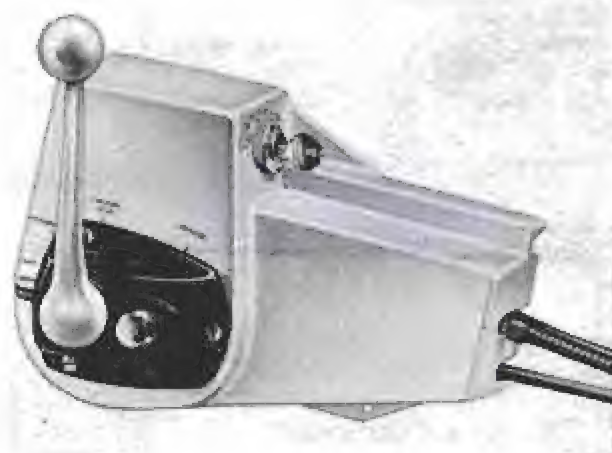
The inputs and the switching circuits, however, should be retained. The wire lead from lug C of S2, normally connected to pin 7 of V1, should, instead, be connected to another phono jack which must be mounted somewhere on the chassis. A shielded cable, terminated on both ends with phono plugs, can then be connected from this jack to the high-impedance input jack of your present amplifier. This arrangement permits both amplifiers to be in use for stereo or monaural applications.

NOTE: Because of the relatively high power supplied by this amplifier, the chassis-mounted parts, as well as the chassis itself, will become quite warm after prolonged operation. This is no cause for alarm, but it does suggest the need for adequate ventilation when the amplifier is mounted behind a panel or in a cabinet.

A table of tube-socket voltage and resistance readings for this amplifier can be obtained by sending a stamped, self-addressed envelope to *Popular Mechanics'* Radio, TV and Electronics Dept. ★ ★ ★

Single-Lever Control For Outboard Motor

With a new remote single-lever unit the boater has complete control over his outboard at his fingertips. A key switch on the unit starts, stops and locks the motor. Pushing in the key electrically chokes the motor. A single lever shifts the motor to forward, neutral and reverse, and also controls the speed. The control unit is one feature of the new 40-horsepower West Bend motor.



Two University of Michigan entomologists have recorded the sounds of insects on 3,000,000 feet of tape, which amounts to almost 600 miles of cricket, katydid and other insect warblings.



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Santa waves his welcome... His reindeer romps under a twinkling sky. These and other exciting new Christmas decorations "come alive" to greet friends, customers, community. Big 4'x6' motion displays are yours for less than \$20.00 complete—with East-Bld Patterns.

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From its jet-sweep front fender and jet-styled nacelle to gleaming tailpipe, the new Sportster H is the motorcycle of tomorrow — yours today!

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And when you want to come down out of the clouds — big, husky brakes stop you gently, safely.

See your Harley-Davidson dealer. One test-ride and you'll decide, it's the Sportster H for you. Or mail coupon for free color literature.



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- **Cuts faster** with *exclusive* Orbite Action—blade cuts on upstroke, backs away on downstroke. Reduces fraying, blade wear, and need for finish sanding.
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- **Exclusive** conventional saw handle for easier handling and more comfortable grip.

With 10' detachable cord

\$54⁵⁰

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—Industrial-capacity sabre saw for professional and heavy-duty use **\$98⁵⁰**

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BECAUSE they're the hottest new products on the power saw market. Engineered for extra power...extra capacity. There's no overheating . . . no faltering . . . when you run into rough material. Disston built these saws to be tough, rugged workhorses.

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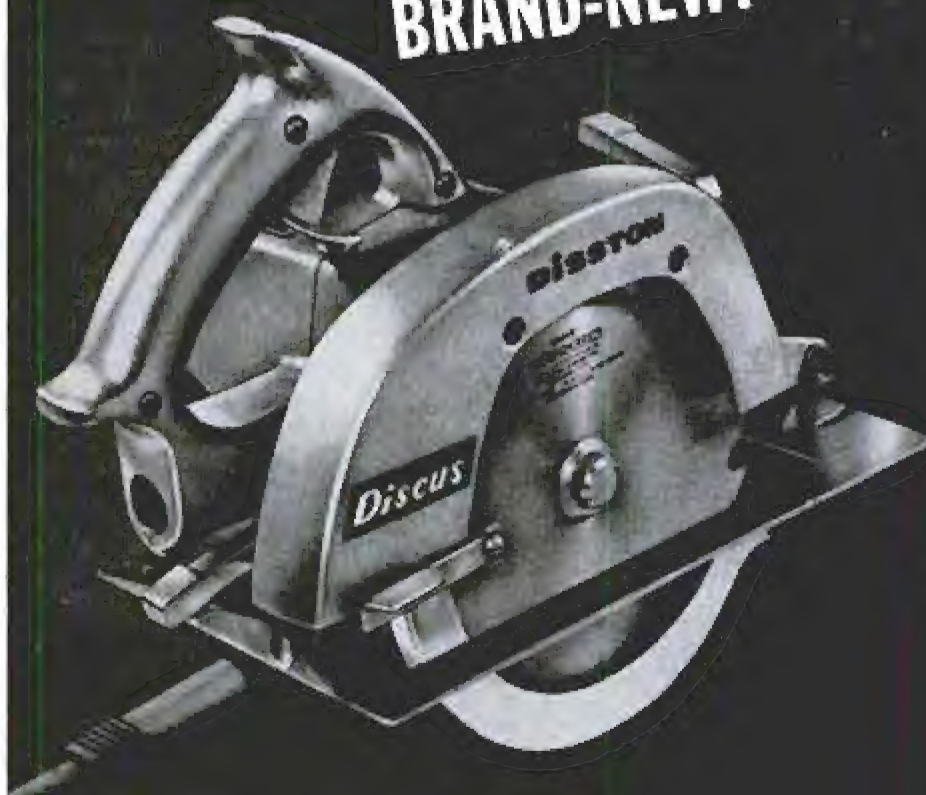
BECAUSE years of experience in fine tool making have gone into the design and production of Disston Power Saws. Disston craftsmen have

created the world's finest hand saws. (Just ask any carpenter.) Now, they offer you a line of power saws possessing features unknown to other makes.

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DISSTON Discus Circular Saw

- **6 1/2" blade**—cuts 2 1/4" at 90°, a full 1 1/4" at 45°.
- **10-ampere rating.**
- **6300 Surface Feet Per Minute** cutting speed—up to 1000 S.F.P.M. more than other saws in the same blade diameter.
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With 10' detachable cord

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DISSTON Defender Circular Saw

For heavy-duty and professional use. Ballbearing. 6 1/2" blade

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NEW DISSTON DRAGON

Electric Hedge and Shrubbery Trimmer

with exclusive fixed all-position handle. Exclusive plug-in cord set. Cuts hedge trimming time to a tenth. 1800 cutting strokes per minute.

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Disston . . . A World Famous Name in Tools

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NEW midget pliers added to KLEIN line



Hardly larger than a package of your favorite cigarettes, these new Klein Midget Pliers will simplify many of those small jobs where space is confined.

Midgets in size but giants in performance, they solve major problems when wiring up electronic assemblies; making model trains, airplanes, automobiles, or in any extremely small or confined work.

These new midgets are additions to the famous Klein line of high-quality pliers that are backed by over a century of manufacturing experience. See your hardware dealer.

No. 257-4 Oblique Cutting Plier	Size 4 in.
321-4½ Long Nose Plier	4½ in.
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Free Bulletin on Klein Pliers

Bulletin 758 lists the many various pliers in the Klein line. A copy is yours for the asking. Write for it today.

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Who Said the Blimp Is All Through?

(Continued from page 101)

Maintenance. An airship is a "long endurance" vehicle, and so it must be possible to make equipment repairs in flight. To facilitate this, electronic units are on long cables so they can be pulled out on the cabin floor for servicing. Or they can be disconnected and taken to a repair bench for test and overhaul. In the same way, all other equipment that may require inflight servicing is made easy to reach. The engine man can even change spark plugs, using swung-down cowlings as a work platform.

Ground Crews. In earlier days, ground crews of 30 or more nimble men might be needed to handle a small airship in landing or taking off. Today, mobile mooring masts and heavy but extremely mobile ground-handling tractors, operated by a few men, do the job more efficiently. Ships can remain moored to their masts in all sorts of weather, swinging in the wind like huge weathervanes. They can land and take off at almost any airfield.

Equipment. Just about the biggest difference between the newest naval airships and those of a generation and a half ago is in the stuff they carry. An early-warning blimp is jammed with radar and other electronic gear. That is why the bag capacity has had to be increased to the million-and-a-half point: the extra lift is needed for extra gear. In the latest design, a gigantic radar-search antenna revolves inside the airship's bag, thus making the bag a radome. This has necessitated the use of plastic instead of aluminum for the ship's nose cone and adjacent bracing—to minimize reflection of the radar impulses. The only metal at the nose is the "flowerpot" by which the ship is moored.

The big antenna suspended inside the ship's envelope is said to enable the radar to achieve better performance, including greater range, than any other type of airborne installation. Besides, "sea clutter" caused by reflection of radar impulses from nearby waves is lessened. Compared with a plane, an airship is considered a gentle sort of vehicle. It moves smoothly, experiences few sudden bumps or jerks; and because everything is suspended from a gas-filled fabric-and-rubber bubble, the gear is in a naturally cushioned mounting. This reduces wear and tear on delicate electronic equipment, permits more accurate readings and means less time and energy lost in maintenance.

Commercial Uses. The idea of using airships for commercial purposes, such as

(Continued to page 250)

HOW AMERICA'S NUMBER ONE CARBURETOR TAKES THE WORLD'S WORST BEATING IN STRIDE!



Roaring up a severe 27% grade at the proving grounds, Rochester-GM Carburetors meter sufficient fuel for good acceleration while climbing, provide leaner mixtures during descent.



Thousands of actual traffic miles are put on Rochester-GM Carburetors to test their ability to deliver performance and economy on the toughest proving ground of all.

Whether you drive in the wintry blasts of Alaska or in the arid regions of Arizona, your Rochester-GM Carburetor has been torture-tested in the lab, on the proving grounds and over thousands of actual traffic miles to assure dependable service. And your Rochester-GM Carburetor Specialist is factory-trained to keep this precision instrument in perfect adjustment for greater performance, greater economy. See him for the best results from your Rochester-GM Carburetor. *Rochester Products Division of General Motors, Rochester, New York.*



Each Rochester-GM Carburetor is subjected to every imaginable quality control measure to assure you of trouble-free travel on the highway.

GM
ROCHESTER CARBURETORS
GENERAL MOTORS

America's
number one
original equipment
carburetors

carrying pay loads, advertising, aerial photography, exploring and police work, is far from being dead. Almost daily, Goodyear Aircraft people receive inquiries from persons who think an airship would be ideal for certain jobs. What generally stops them is the little matter of money. Airships require capital for building and operating commercially. By comparison, in such military work as antisubmarine patrolling and early-warning watching, they are said to be less expensive than comparable heavier-than-air units. Even if this were not true, the airship still would be considered valuable in defense work, for it is maintained that, on the basis of records of two World Wars, nothing has been found superior to the airship for antisubmarine patrolling, especially in connection with convoys.

In this day of many kinds of missiles, the airship is considered to be virtually no more vulnerable than the airplane. That is, in action involving missiles of tremendous destructive power, it would not matter much whether an aircraft in missile range were traveling with the speed and maneuverability of a plane or with the relative leisure of an airship.

Thus with respect to technical developments, the airship has not been standing still. And because of its new-found abil-

ity to function as a long-range flying radar station, plus its war-proved knack of finding and scaring off or sinking submarines, it seems likely that it will be around for some time to come. ★ ★ ★

☛ A memorial has been erected in Humboldt County, Calif., to a plant-eating beetle that was introduced in 1946 and has since cleared a half million acres of the Klamath weed, deadly to livestock.

Do You Know This Old-Timer?

(answer to quiz, page 14)



1915 FORD



Solder



Thaw frozen pipes



Antique furniture

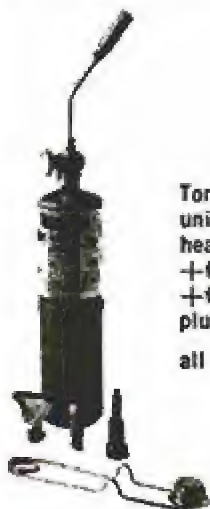
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erations—all with precision and perfectly smooth edges. See it work—ask for a demonstration.

Model 162 Router ½ h.p. \$49.50

Model 100 Router ⅜ h.p. \$57.50



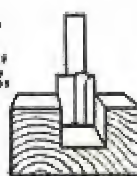
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Corner Round Bit . . .
for rounding off the edge of any flat wood surface.

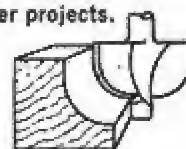


Straight Bit . . .
for stock removal, grooving, dadoing, inlay work and relief routing.



Rabbeting Bit . . .

for making rabbet or step cut for drawers, cupboard doors and other projects.



IT GROOVES, INLAYS, ROUNDS, CORNERS, MORTISES, EDGES . . . CUTS WOOD, METALS, PLASTICS, COMPOSITIONS

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In Canada: write Porter-Cable, Ltd., Box 5019, London, Ontario. Canadian prices slightly higher.
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Porter-Cable Machine Co.
8269 Marcellus St., Syracuse 4, N.Y.



NEW

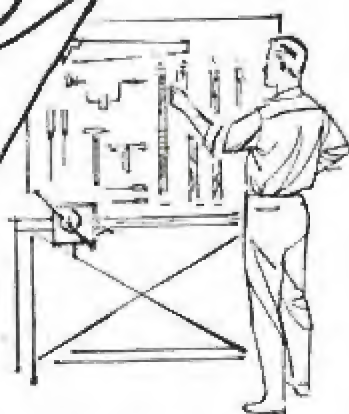
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FOR GREENLEE TOOLS

*newest, best way
to buy and keep bits
and chisels... every tool
reaches you factory-sharp
in a permanent container.*

Perma-Pak hangs at your workbench or fits neatly into your tool kit. Sizes boldly labeled to give you instant selection.

Only GREENLEE has Perma-Pak... only Perma-Pak gives you these advantages... and at no extra cost!



Look for GREENLEE tools in new Perma-Pak at your favorite hardware or building supply dealer.



GREENLEE TOOL CO.

2111 Columbia Avenue, Rockford, Illinois

Detroit's Year of Decision

(Continued from page 81)

disappointing experience with the "advanced" styling of Mercury, Ford's stylists have apparently decided that they went too far too fast. As a result, the entire 1959 line from Ford up is keeping the same image as it has had previously (a formula that, until 1959, GM had been devoted to and prospered with). The new Ford, Edsel, Mercury, Lincoln cars are, to use the words of the Ford stylists, more "automobile" than GM's "spaceships." They have changed, but the change is evolutionary.

Chrysler, too, has changed. But its changes are small indeed compared with either Ford or GM. Here the decision was undoubtedly influenced more by resources than by philosophy, but the motive matters not. Chrysler, this year, represents the little-or-no-change-at-all school. If you feel that the industry should not make drastic annual changes which artificially "wear out" your investment, you can demonstrate your belief by buying Chrysler (of course, it is only fair to warn you that Chrysler has big plans for 1960).

There you have the lineup. Take your pick and cast your vote. Detroit wants you to stand up and be counted—on the cash registers.

Buy General Motors and you are, to some extent, voting for continuing the fast-moving postwar styling changes for which the industry has been praised by some and condemned by others.

Buy Ford and you are voting for restyling with a retention of character, for a restyling that keeps the over-all image while gradually outdated the sheet metal. It may make you want to own a new model, but you are not disgraced if you don't.

Buy Chrysler and you could almost be considered as voting against the practice of annual styling changes.

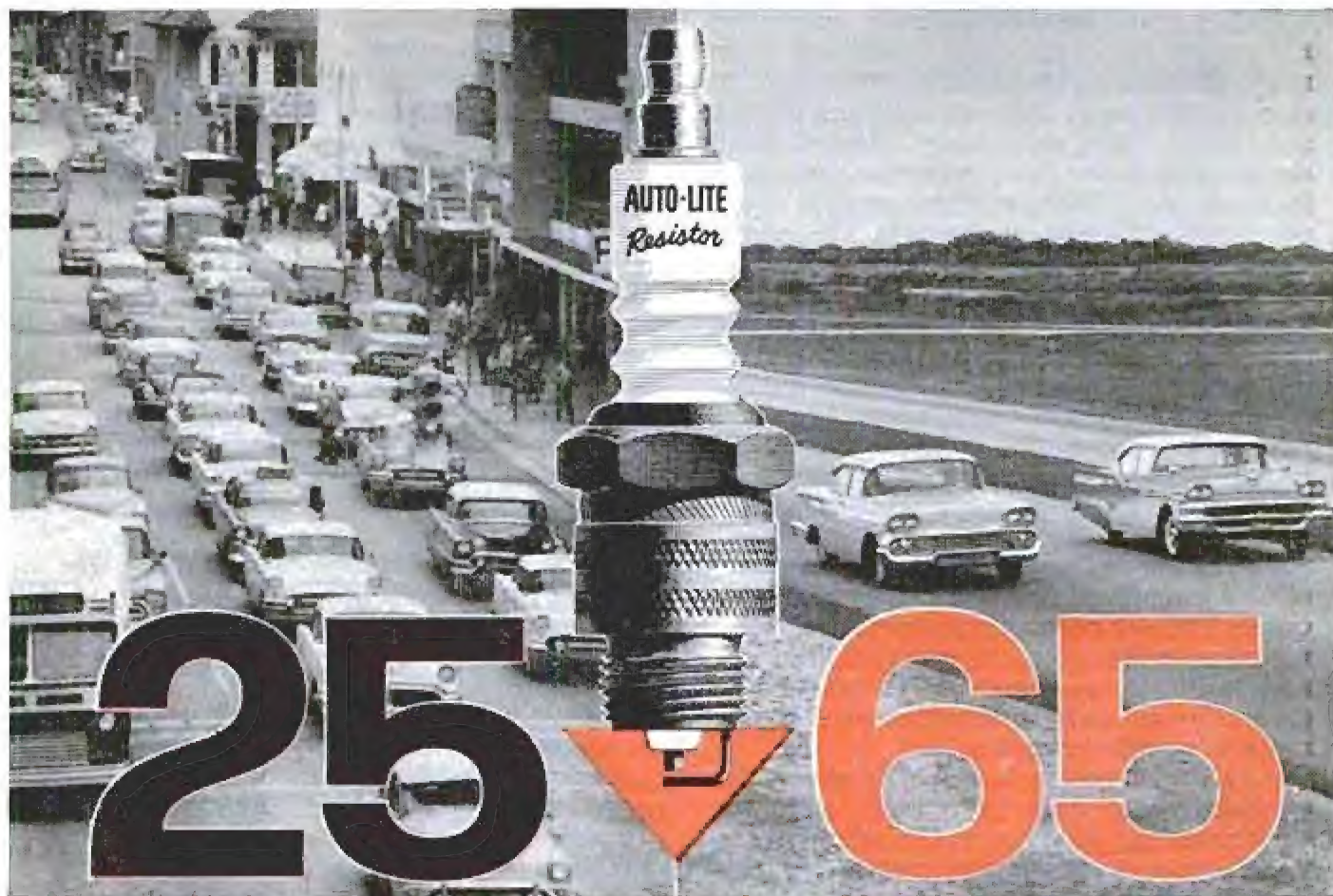
Buy Rambler and you will be coming mighty close to agreeing with the critics who claim automobiles have lost their symbolism and that all you want is a good, reliable, neat car which doesn't take up too much space on pavement or in garage.

Finally, if you want to prove that you are completely indifferent to the whole exciting automobile business, you can refuse to buy a car at all and this will confuse the motivation researchers even more.

But, you ask, isn't there some other reason for buying a new car than its styling?

Of course there is, and these 1959 models are offering some (although not many) new engineering refinements to make them more attractive to you, the customer.

(Continued to page 254)



IN TOWN TRAFFIC . . . some spark plugs, designed for high speeds, become fouled and cause misfiring and loss of power when driven at low speeds.

ON THE HIGHWAY . . . some spark plugs, designed for low speeds, misfire causing power loss and invite destructive pre-ignition when driven at high speeds. Why gamble when . . .

Auto-Lite Resistor Spark Plugs with **POWER TIP** "Fire Up" your engine* at all speeds!



If you drive at both town-traffic and highway speeds, here's why you should use Power Tip . . . the first spark plug ignition-engineered for today's engines and today's driving.

YOU CAN SEE
THE BIG NEW
DIFFERENCE IN
SPARK PLUGS!



At low speeds, the projecting Power Tip is in the thick of combustion where it gets hot quicker and stays hot to burn fouling deposits away *clean*. At higher speeds, the projecting tip is in the path of the incoming air-fuel mixture where it stays cooler to effectively *check* power-robbing pre-ignition. Ask your garage or service station to install Auto-Lite . . . the *only* spark plugs with Power Tip . . . and start enjoying top performance and economy from your car at *all speeds*.

*Power Tip, with or without Resistor, is ignition-engineered for overhead-valve V-8 engines and for most overhead-valve 6-cylinder engines in all these cars—Buick, Cadillac, Chevrolet, Chrysler, De Soto, Dodge, Edsel, Ford, Hudson, Imperial, Lincoln, Mercury, Oldsmobile, Nash, Packard, Plymouth, Pontiac, Rambler, Studebaker.



Ordinary Tip Power Tip

Power Tip protrudes farther into the combustion chamber for better ignition. Fuel burns more evenly and completely to give top performance and economy at *all speeds*.

AUTO-LITE RESISTOR SPARK PLUGS WITH POWER TIP

Auto-Lite makes a complete line of spark plugs, including Standard, Resistor, Marine, Small-Engine, Transport, and Aircraft.

Riding qualities have been improved noticeably in all the cars. There has been more emphasis placed on comfort than in any recent year. Almost all cars absorb road shock more completely. Most of them are much quieter both in engine noise and in road noise. Most of them handle more precisely and steer more easily. Their lower center of gravity helps cornering and comfort in the turns.

Although many are heavier, gasoline economy is expected to be about the same or, perhaps, even a little better due to changes in the rear-axle ratios. Acceleration is, therefore, not as good as in 1958, but this is an academic point inasmuch as most drivers never use all the available power anyhow.

Paints are better as almost all companies offer a long-lived finish that they claim requires little or no waxing or polishing (this remains to be seen, of course). Mufflers and tailpipes are expected to last longer generally as most companies use coated metals to resist corrosion.

Additional comfort is provided by the availability of split front seats, whereby the driver can sit close to the wheel, while the front-seat passenger moves his seat back for added legroom. Reclining seats with adjustable headrests are available on AM cars. Swiveling seats are optional on

all Chrysler Corporation cars. These make entry and exit easier and more graceful.

Back-seat passengers will be more comfortable in winter now that GM has found a practical way to pipe hot air into the rear of the car. Flat, narrow ducts run along each side of the transmission hump underneath the carpet and carry the heated air to the back.

Treads are wider on many cars as engineers strive for greater stability on the highway. This added width also improves air circulation around the brake drums and lowers underhood temperatures by allowing a greater volume of air to flow through the engine compartment (Pontiac, for example, with the widest tread of all, claims a drop of 40 degrees under the hood).

Brakes have been improved, both by increasing lining area and by improving air flow across the drums as the industry realizes that the heavier, lower cars require better brakes.

Generally, however, this has been a year for the stylist and your choice of a car will probably hinge more than ever on its appearance. That is why the year 1959 promises to be so interesting.

Whatever you decide to do, do it carefully. The industry, smarting under the sharpest criticism of its history, will be watching and planning. ★ ★ ★

Save \$115⁰⁵ on this \$245 value!

Portable 115 V. power plant only

\$129⁹⁵

FOB Minneapolis
(Shipping weight: 90 lbs.)

1200 watt continuous duty, 60 cycle a.c., complete with 3 hp Briggs & Stratton 4-cycle engine on lift-off mount



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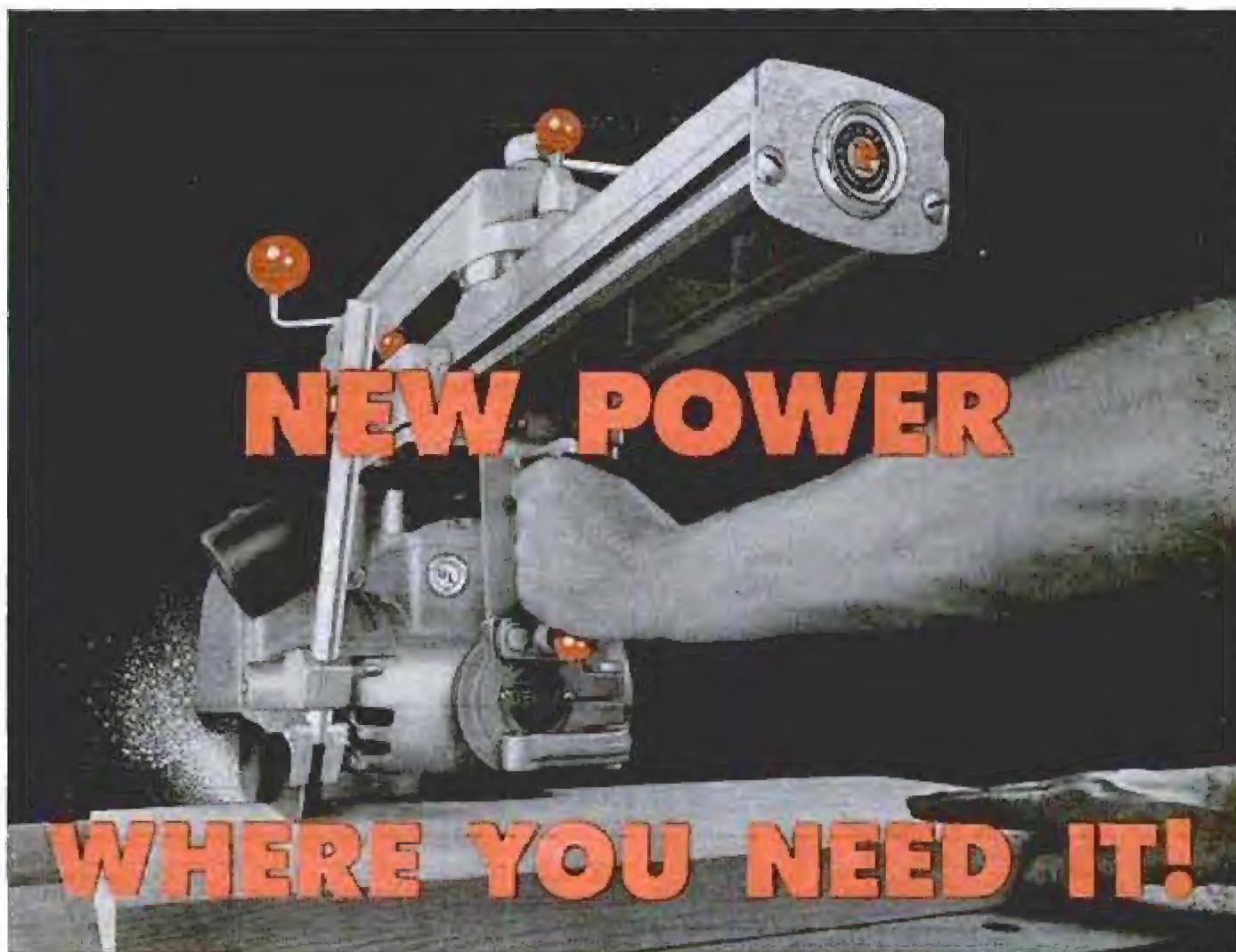
Here's the power plant buy of the year! A 1200 watt, 60 cycle a.c. 115 volt generator (with 15 amp. overload fuse and duplex receptacle for 110 volt outlets) complete with 3 hp Briggs & Stratton engine for only \$129.95 fob Minneapolis! Engine and generator are mounted on 14-gauge steel platform with two semi-pneumatic 8-inch wheels for easy transport. Engine lifts off special mounting base (no tools needed) for use on other jobs around your farm, home or cottage. Extra mounting bases are available.

Now you can have your own portable electric power source for use wherever or whenever public power is not available—in the field, or during emergencies caused by floods, hurricanes and other crippling storms. Use the engine alone on a cement mixer, lawn mower, pump, sprayer, saw, golf cart, small car. The engine has full throttle control, oil-bath air cleaner, recoil starter—and it's backed by the new-engine (90 day) Briggs & Stratton guarantee.

Compare and see! This is a \$245 value! You save \$115.05! And it's brand new!

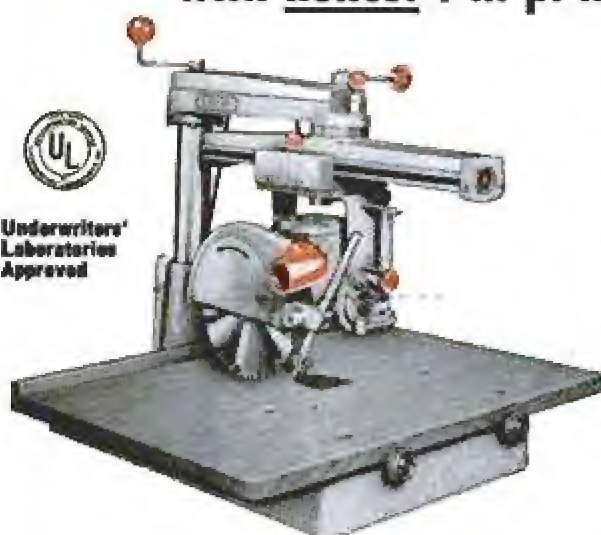
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NEW DELTA "SUPER 900" RADIAL SAW

with honest 1 h. p. motor that develops up to 2 full h. p.!



NEW DELTA "SUPER 900": Honest 1 h.p. motor guaranteed for a full year! New "up front" guide fence positioning knobs and easy access controls. Plus exclusive combination of Delta Quality features: double overarm construction, and select edge grain fir table.

It's the guts—not the gimmicks—that count in a radial saw. Delta's new "Super 900" has *honest* power where you need it—at the blade—for greater sustained cutting, faster, smoother working, and safer operation. *More power than any 9" home workshop radial saw ever built!* The "Super 900" is actually a complete, all-purpose workshop. With Delta's *exclusive* "turret arm" action you can swing, spin and tilt the head; any job is easy, even left hand mitering.

See this incomparable new "Super 900" today at your Delta dealer—he's listed under "TOOLS" in the Yellow Pages—or at leading department, hardware or building supply stores. Arrange easy terms to suit you. Rockwell Manufacturing Co., Delta Power Tool Division, 502L N. Lexington Ave., Pittsburgh 8, Pa.

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BUT THIS . . . true professional-type integral $\frac{1}{4}$ h.p. Motor-Compressor outfit, complete!



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complete ready to spray \$39⁹⁵
(\$40.95 in 11 western states)

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Electric Sprayit Division
Sheboygan, Wisconsin, Dept. PM-11

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Salt-Water Battery

(Continued from page 126)

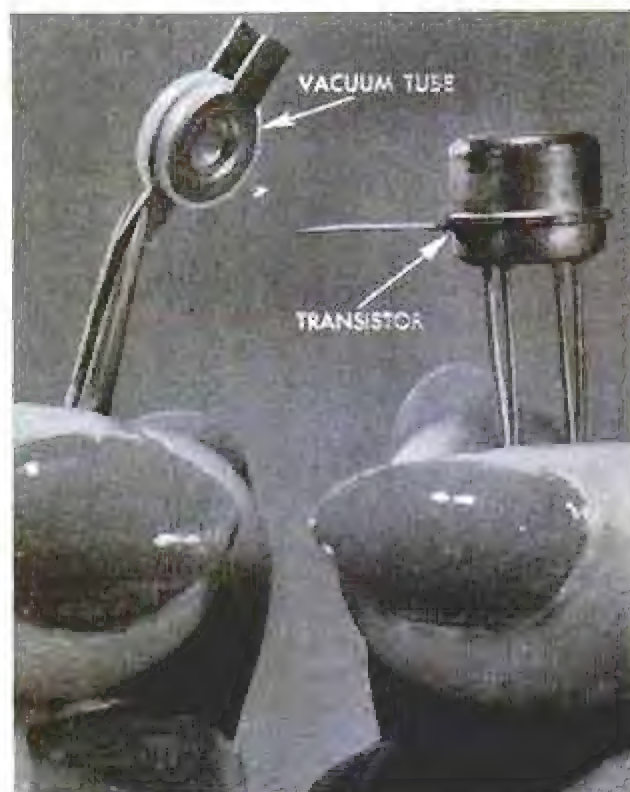
wire. A mooring line from the underwater buoy ascends to the surface and is attached to the skiff. In effect, the skiff is anchored to the buoy instead of to the weight at the bottom.

In somewhat similar studies on the Atlantic, the Bureau of Standards is preparing to launch a number of free-floating robot weather stations. Basically these are spar buoys with a radio antenna that rises 10 feet above the water. Every six hours each buoy will report the wind direction and speed at its location, the barometric pressure, and the air and water temperatures. This information will be automatically broadcast by a radio transmitter that also gives the identifying code name of the particular buoy. Location of each buoy will be determined by radio triangulation each time it broadcasts its information.

★ ★ ★

Tiny Electronic Tube In Laboratory Stage

Constructed of layers of titanium and a special ceramic material, electron tubes as small as transistors are being developed in the General Electric Research Laboratory. The new vacuum tube is not much larger than a shirt button but it operates at temperatures of from 900 to 1500 degrees Fahrenheit. The tiny tubes are not yet commercially available.





THE RED BARON KEEPS A RENDEZVOUS WITH DEATH!

LEFT:
SOPWITH CAMEL
AND FOKKER DR-1,
69¢ EACH



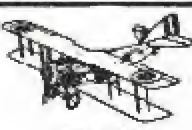

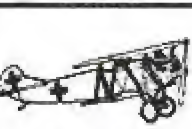







Maneuvering his Fokker Triplane with the daring of the devil himself, "Red Baron" Von Richthofen had personally accounted for 80 Allied planes when he met Captain A. Roy Brown that fateful April day in 1918. In England's Sopwith Camel, the fleet Fokker had at last met its match. Short, deadly bursts from Brown's twin Vickers fired the German's fuel lines and down plummeted the Red Baron, never to rise again!

START BUILDING YOUR COLLECTION NOW!

Aurora makes over 150 model kits—planes, ships, tanks, trucks, figurines, etc.—but its **FAMOUS FIGHTERS OF WORLD WAR I** top the popularity polls. Everybody wants to re-create these super-detailed little battlers and enjoy the devil-may-care yarns that go with them. There are 14 in all, from 69¢ to \$2.49 each, at stores everywhere. Easy to assemble, complete with instructions, crew members, authentic decals and ground panel. It was a time of high adventure, and with Aurora models, you are there!



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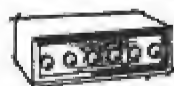
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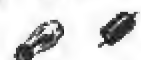


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Address

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Underground Missile Base

(Continued from page 129)

and space craft that are "too big" to be fired safely from Cape Canaveral in Florida will be launched. It is also an operational site for long-range missile warfare. The base uses the new Pacific Missile Range that consists of two fan-shaped regions spreading over portions of the Pacific. One extends for more than 5000 miles to the west, beyond the Hawaiian Islands, Midway and Wake. The other extends south, all the way to Antarctica. On this last range the earth satellites that are intended to orbit across the poles will be launched.

Already in use at Vandenberg are launching facilities for Atlas ICBMs and for Thor intermediate ballistic missiles. These sites, too, are hard, although not to the extent employed for Titan. As much as possible the sites are built flush with the surface of the ground. Each Atlas launching pad, for example, is at ground level with only the service gantry rising into the air. Storage tanks for fuel and liquid oxygen are beneath, in reinforced-concrete structures. At the Thor IRBM sites, control blockhouses are partially below ground, their roofs buried under mounds of earth.

Vandenberg AFB occupies 64,000 acres near Lompoc, Calif., and adjacent to it the Navy has a 16,000 acre site for testing its own rockets. A main railroad traverses both areas, and launchings will be conducted only when no trains are nearby.

Oxygen men, warhead specialists, rocket electricians, among other specialized missile technicians, already are receiving training at Vandenberg AFB. After specialized studies in their particular fields the men are grouped into launch crews that operate as teams. ICBM teams, upon graduation, will be assigned to the new ICBM sites being prepared at Spokane, Wash.; Cheyenne, Wyo.; Denver, Colo.; Omaha, Neb. and elsewhere. IRBM crews graduated at Vandenberg will be sent to the overseas operational sites for intermediate missiles. ★ ★ ★

How Fast Is g?

Scientists at the National Bureau of Standards are trying to determine exactly how rapidly the speed of a falling object increases. The rate of acceleration of gravity (designated by a small g) is 32.155 feet per second at Washington, D. C. But the figure may be off by eight parts in a million. The scientists hope to cut down the error to one part in a million by dropping a metal bar in a vacuum and timing its fall with the aid of an atomic clock.



NEW HONEYWELL DECORATOR LIGHT SWITCH!



*Change it
any way,
any time*



*to match
your room's
decor!*



THE TRANSPARENT decorator plate on the new Honeywell TAP-LITE* snaps off for easy decorating, cleans easily. Just wipe with a damp cloth. Simple to install, TAP-LITE has screwless terminals. Easy to operate. Tap, it's on. Tap, it's off! Switch and plate \$1.95 at all leading retail stores.

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STICKS ALMOST ANYTHING TO ANYTHING

GOODLOE E. MOORE, Incorporated, Danville 10, Illinois

KEEP YOUR WORKSHOP TOOLS SAFE AND ORDERLY



This 7-drawer machinist's chest has a place for every tool. Extra durable heavy gauge steel. Felt lined drawers protect delicate edges... operate easily. Size: 8½" x 13½" x 20¼". \$27.95 at leading hardware stores. Slightly higher west. Other home workshop models from \$1.25 up.

WATERLOO VALVE SPRING COMPRESSOR CO.
Waterloo, Iowa

*There is nothing like
the feel of the right gun... or the right tool
and the knowing how
to use it*



WEN



\$29.95

THE RIGHT POWER SAW—Cuts 2x4's in seconds—cuts ½" steel. Does work of rip, jig, cross cut, scroll, coping, hack, band, keyhole saw. Cuts any shape; straight lines, curves, circles, designs. Makes own starting hole. Saw Kit with saw, rip guide, circle cutting attachment, metal carry-box, 3 blades \$32.95.



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THE RIGHT ELECTRONIC SOLDERING GUNS—Ideal for practically all home soldering jobs. Working hot in 2½ to 5 seconds. Long reach, long life tips. Automatic spotlight. Sturdy plastic housings, all perfectly balanced. 6 models—feather-light 100 watt to 250 watt heavy duty. Other guns and kits \$5.95 to \$15.95.



\$29.95

THE RIGHT 2-SPEED, ½" POWER DRILL—Changes from 1000 to 3000 r.p.m.—change is quick, positive. AC/DC motor delivers maximum torque under load. 35 piece Accessory and Toter Kit \$9.95.



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Your Name.....

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Road Block Ahead!

(Continued from page 142)

to inspect the separate emergency-braking system that also is required by law. This system automatically applies the trailer brakes if the main air line from the tractor happens to break or if air pressure drops too low.

Straight air is not the only booster system used for brakes. There are straight vacuum systems, air-over-hydraulic systems, vacuum-over-hydraulic, and electric systems. Sometimes there are combinations, such as air brakes for the tractor and vacuum for the trailer. The ICC inspectors are trained to check every combination.

Sands explains that brakes that are in perfect condition can still fail if a driver uses them too much while descending a long hill. At the start they give 100 percent braking, then they begin to fade and shortly the driver has no brakes at all.

The reason is that the brake drums heat up and expand, then the shoes have to travel farther to remain in contact with the drums. Finally the push rods of the booster system reach the end of their stroke and can't push the shoes no farther. At that point the brakes are useless. The safest way to get down a long grade is to use a low gear and apply the brakes sparingly.

To help their drivers, some transportation companies are installing reserve brake indicators on their trucks. This device is actuated by the booster push rod. It flashes a warning light in the cab shortly before the push rod reaches its limit of travel. It tells the driver that his brakes are in a dangerous condition and that he should stop at once to let the drums cool off. The indicator has up to eight warning lights, one for each brake of a truck and trailer or a tractor and semitrailer.

Drivers never know when the ICC will block a highway, or where, or how long the inspection period will last. Sometimes every main road leading into a state is blocked. Sometimes the inspection period lasts for a day, sometimes for a week.

"Word soon gets around after an ICC inspection starts," Sands remarks. "Then we are apt to hear that every big garage for 100 miles down the road is busy making repairs to trucks. That's fine. The more safe trucks we find, the happier we are."

Most truck drivers welcome the safety inspection, for they know their lives are at stake. Sometimes a driver points out a faulty condition that his shop hadn't gotten around to repairing. The driver knows that an adverse report from the ICC will bring fast action.

Recently, the state of California put a

shaw

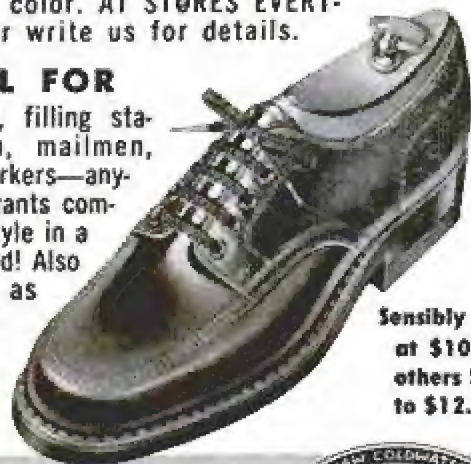
shoes are designed for men whose feet are part of their job!

Here's a sturdy work oxford, with all the styling, fit and comfort of a dress oxford! Shaw's high value features include full cushion insole heel to toe with metatarsal pad and cushion side arch support . . . oil resistant Neoprene sole . . . steel arch . . . Nylon stitched . . . plus the finest leathers and craftsmanship, in black or Cordovan color. AT STORES EVERYWHERE, or write us for details.

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mechanics, filling station men, mailmen, factory workers—anyone who wants comfort and style in a work oxford! Also available as high shoe.

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roadblock on Highway 99 and made the most comprehensive safety check of commercial vehicles ever conducted. The site of the inspection was at the top of a long, steep grade a few miles north of the town of Dunsmuir. During the past year several trucks had roared down the grade out of control, including one that careened into the business section and killed several people.

For 24 hours, every southbound truck was flagged off the highway and sent along a secondary road where the inspections were made. One hundred and fifty highway-patrol officers, state employees, representatives of the trucking industry, and local law-enforcement officials worked in teams, using \$20,000 worth of test equipment for the check.

Inspection included the following: Load on each axle, number and size of tires, numbers and size of brakes, muffler-noise test with a decibel meter, and a comprehensive mechanical inspection of the whole rig. Brake tests included: Stopping distance with brakes cold, stopping distance with brakes hot at the foot of the grade, brake-drum temperature at the foot of the grade, air-transmission time from tank to farthest brakes, air leak-down time, and number of brake applications required to activate the air-pump governor.

Purpose of the inspection was not only to remove unsafe trucks from the highway before they started down the long grade to Dunsmuir, but to obtain information that would help determine whether additional safety legislation is needed.

Dangerous vehicles don't belong on the highway, despite the fact that mechanical failures are not a leading cause of accidents. Eighty-six percent of all accidents, 13 out of every 15, are caused by faults of drivers. The figure is almost exactly the same for both professional drivers and the driving public.

Sands tells audiences of truck drivers all about the accident that some of them will have in the future. He shows that the seeds of the accident are already present in their minds.

"One of the main reasons a driver has a wreck is bad driving habits," Sands says. "These include passing blind, tailgating, excessive speed for the conditions, lane changing without clearance, and other errors. A driver may get by with a bad habit for months or years; eventually it catches up with him.

"He can avoid the accident by changing jobs and not driving, or by recognizing any bad habits and overcoming them. He has to work at it and build up a pattern of auto-

(Continued to page 262)



HOME WORKSHOP

Protect planes, saws, gauges, power equipment—all other tools.



SPORTSMEN

Store reels, hooks, lures, pistols, rifles, shotguns, etc.



BOAT OWNERS

For compasses, motors, pumps—all corrosive gear.

AMAZING NEW TREATED BAGS PREVENT RUST ON TOOLS, GUNS, REELS, TACKLE!

New Kind of Rust-Prevention Bags Developed for Armed Forces Now Released for Civilian Use

Put anything made of corrosive ferrous metal into one of these new chemically treated bags. No matter how long it is stored, you'll never find a single trace of rust. This miracle is brought about by the impregnation of heavy-duty paper with anti-rust chemicals. This creates a harmless, invisible vapor which, in turn, acts as an impenetrable wall to block out rust and corrosion—for as long as three years! Regardless of weather, humidity or any other rust inducers, protection is guaranteed. Forget the messy oils, greases and smeers you may have been using.

These amazing new anti-rust bags are sent to you in assorted sizes for protecting fishing gear, tools, gauges, guns and boating equipment. Large sheets are included for wrapping bulky objects, or they can be cut to use as liners for tool boxes, tackle boxes, gun cabinets, etc.—with guaranteed protection.

SPECIAL INTRODUCTORY OFFER—To acquaint you with the remarkable effects of this amazing new product we will send you: 9 ANTI-RUST BAGS in assorted sizes plus 2 LARGE SHEETS of anti-rust paper plus 1 SPECIAL HAND SAW BAG—all 12 pieces for only \$2.49. Saving just one tool from rust cor-

rosion will more than pay for a full 3 years' supply.

SEND NO MONEY—Just fill in coupon below. When postman delivers your anti-rust package pay him amount of order plus C.O.D. postage. Or save money, send payment with order and we pay all postage charges. You must be convinced that this is the greatest anti-rust product you have ever used or your purchase price will be refunded immediately. **ORDER TODAY** while supply lasts.

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3916 Geraldine Ave., St. Louis 15, Mo.

Please send me the new anti-rust material as checked on guarantee that I must be satisfied or my money will be refunded immediately.

☐ Kits at \$2.49 each, Contains 9 assorted bags plus 2 large sheets and extra hand saw bag.

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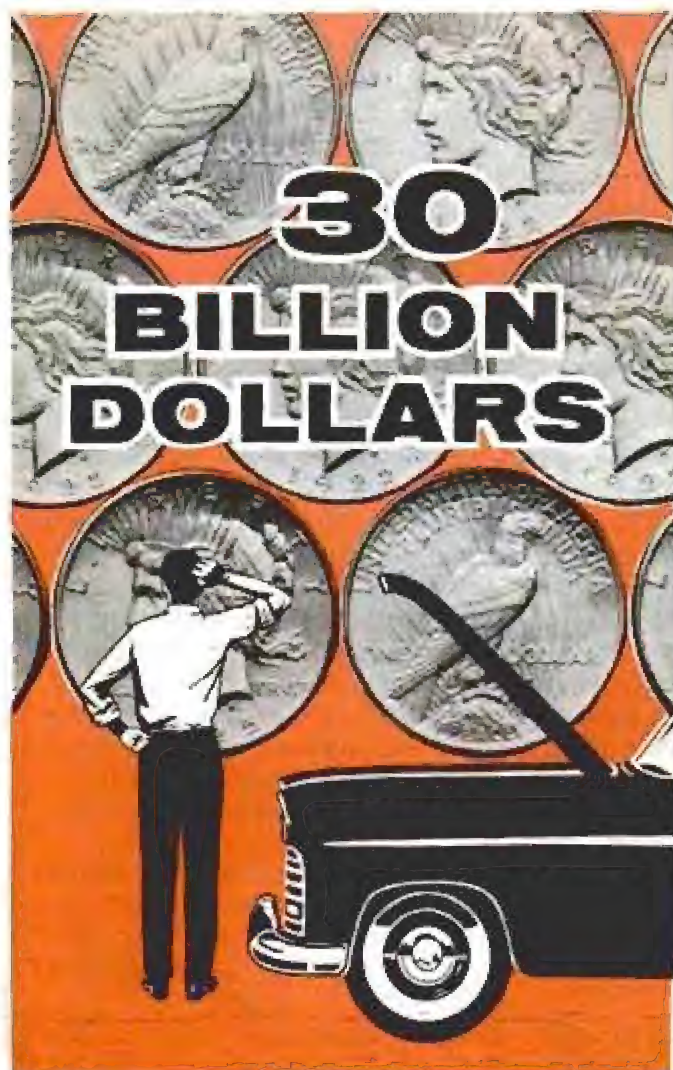
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☐ Cash enclosed
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plus postal charges

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ALL THAT MONEY WILL GO INTO CAR REPAIRS DURING THE NEXT 12 MONTHS—and you will have to pay \$425.31 according to a national survey *unless* you start avoiding costly repairs now with Wynn's Friction Proofing.

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Your car will last longer and run better when you use Wynn's Friction Proofing products which are engineered to *fight trouble* and *prevent trouble* in your car's engine, radiator, upper cylinder and transmission.

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matic good habits stronger than the old pattern.

"Another big reason for driver-failure accidents is inattention. This may be caused by fatigue, liquor or stimulants, turning the head away from the road, or by daydreaming.

"Everyone daydreams at the wheel. The driver's mind is elsewhere much of the time and the 'automatics' in his brain are in charge of the truck. This is perfectly all right if the automatics are based on good driving habits and as long as his daydreaming isn't too vivid.

"Here's an incident that happened not long ago. A man who had lost an important business deal was reliving the whole thing in his mind while driving home. He was an experienced driver, but on this trip he changed lanes in such a way that he caused a fatal accident. His own car wasn't touched and he drove home completely unaware of the accident.

"Later, a driver-instruction apparatus was set up with the same highway and the same traffic simulated on its screen. The man was asked to pretend that he was driving home. Meanwhile, one of the men in charge of the test described the business deal to him and sympathized about how he had lost it. What he was trying to do was to put the driver in the same mental state as before. Sure enough, the driver made exactly the same lane change he had before, at the same point on the road, and in the same traffic. If he had been on the highway, the same accident would have been repeated.

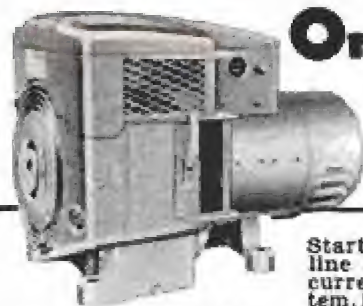
"This is a pretty positive demonstration of how a person's private life controls his driving. Inattention, based on daydreaming, is one of the greatest causes of accidents. Professional and nonprofessional drivers alike should guard against it."

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Traffic officers will get an assist from a radar set developed in England that can spot speeding cars in heavy traffic. One of the major objections to traffic radar has been its inability to discriminate between vehicles in dense traffic. The lightweight British set, using transistors and printed circuits, can provide separate readings on cars only eight feet apart. It is accurate to within one mile per hour and can be set to "lock on" automatically to any individual reading.

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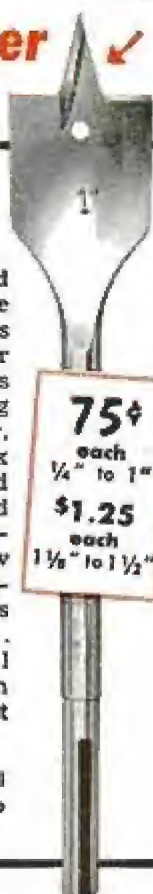
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Capable of staying in the air over one location for long periods, an electrically powered pilotless helicopter is powered through a cable leading from a gas-turbine-driven generator on the ground. The plane was developed by Kaman Aircraft for the Navy as a long-duration platform. It is designed to operate automatically and maintain a station at given altitudes.

Fingerprints on Cloth Exposed by Formaldehyde

No more can criminals destroy their fingerprints merely by wiping door handles and guns. Japanese scientists have found a method for picking up latent prints on paper, cloth or anything else the criminal may have touched. The material being investigated is exposed to fumes of formaldehyde made with radioactive carbon. The formaldehyde combines with the body chemicals left by the fingers. Then the excess formaldehyde is removed and the material is stored in a refrigerator while in contact with a photographic film. The radioactive carbon "exposes" the film. When developed after several days of this exposure, a good photographic image of the hidden fingerprint can be obtained.

☞ Cottonmouth moccasins are receiving injections of radioactive iodine to discover more about the little-known nature of snake venom, a medical scientist at the University of Florida reports.

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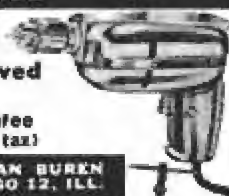
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TV "Scout" for Icebreaker Looks 35 Miles Ahead

Ice reconnaissance as far as 35 miles away from an icebreaker is now possible through airborne television. The TV pictures are transmitted from a camera aboard a helicopter to two television monitors on the icebreaker—one on the bridge, the other in the combat information center. Thus, officers on the ship are able to make constant evaluation of ice conditions far ahead on the ship's course. The TV monitors clearly show telltale signs indicating the path of least resistance through heavily packed ice. Icebergs and open patches of water are clearly seen on the monitors, and observers on the ship are able to distinguish between old and new ice, pack ice and pressure ridges.

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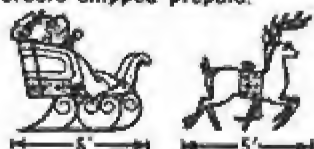


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Now It's Sunburned Fish!

Did it ever occur to you that fish might suffer from sunburn? They do. In the wild they can dive deep or take to shady spots. In hatcheries it's something to worry about. So the government's Fish and Wildlife Service has been doing some worrying, and its nutrition laboratory at Cook, Wash., has come up with the fact that a diet enriched with niacin will help a sunburned salmon—its skin peeling and discolored, with blisters and lesions—back to health.

Move Over, Laika!

Were spores the first space travelers? Spores of common bacteria and fungi can survive the airless environment of space, according to research at the Wright-Patterson Air Development Center. Such spores were subjected to a vacuum equivalent to that 100 miles above the earth. Beyond that point the atmosphere does vary greatly. The spores survived the exposure for 32 days and showed no evidence of damage or reduction in germination.

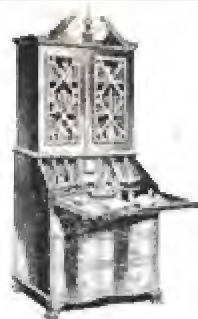
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Laboratory experiments indicate Colorado oil shale can be converted directly to heating gas by a process that utilizes up to 100 percent of the active matter in the shale. The present processes, which first convert the shale to liquid oil, use only 80 percent of the active organic matter. In the new one-step process, crushed oil shale is treated with hydrogen under high temperature and pressure.

Atomic Heating Plants For Swedish Homes

Experiments in heating houses with atomic reactors will be started soon in Sweden. The reactors will be buried in underground rock in a suburb of Stockholm and in the city of Vasteras, about 70 miles from Stockholm. Heated water from the reactors will be circulated to the homes. The two reactors also will produce a total of 200,000 kilowatts of electrical energy. The projects will be fueled by natural uranium and moderated by heavy water.

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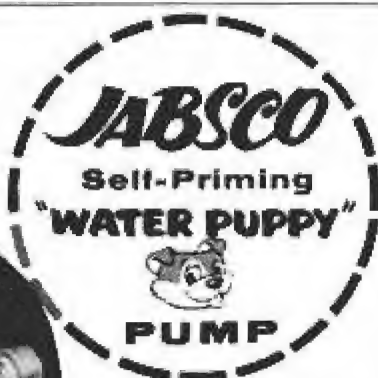
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Missile Engineers Have Problems

You think you have troubles? Consider the missile engineer. If he builds an intercontinental ballistic missile with more than 300,000 parts—any one of which could fail to operate properly—the ICBM must have an over-all reliability of 99.9999 percent if it is to perform as planned nine times out of ten.

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Developed originally for aircraft windshields, a British de-icing and demisting device is now available for use on automobiles, ships, refrigerators and the like. It consists of a transparent film of gold and metal oxide, two ten-millionths inch thick, inserted in panels of laminated glass. The film is deposited on the inner face of one sheet of glass so that it is protected and completely insulated in the finished screen. If sufficient voltage is supplied, the film can carry up to 1000 watts per square foot.

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Treat frostbite the way Eskimos do—with heat—is the advice of Stanford University medical researchers. Dr. Frederick A. Fuhrman, professor of physiology, and his research-assistant wife, Geraldine, report that a quick-thaw treatment in water of about 108 degrees Fahrenheit reduces the chances of permanent damage to frost-bitten fingers, toes and ears. However, they caution, the frozen part should be immersed in hot water only long enough to raise the temperature of deep tissue to about normal.

¶ In the past few years a number of sheep with golden-hued wool have been born in Australia.

Fast-Growing Algae May Feed Spaceman

Humans on space trips of the future may subsist on a new strain of algae that increases 1000 times a day, compared to ordinary strains that increase only eight times a day. In the presence of sunlight, algae remove carbon dioxide from the air and replenish the oxygen supply while producing nutritious food. Cultures of the new algae are pumped past a pencil-sized lamp that produces light many times the intensity of sunlight, in space-nutrition experiments.

¶ To explore details of tooth and bone structure, the University of Michigan's dentistry school has developed a machine that can grind samples of tooth and bone to approximately 30 microns in thickness—far thinner than a sheet of paper.

Pills for Plants

Gardeners some day may give a "pill" to a wilted cabbage to treat the disease that threatens its life. Scientists at the Connecticut Agricultural Experiment Station are studying ways of fighting rots, blights and other plant diseases with chemicals. They have found that purine compounds will combat virus infections in plants, but the chemicals are still too expensive for use in fields.

¶ A wormlike bug with 700 legs has been found by a Miami, Fla., scientist in Panama. Living under stones or rotting logs, its body consists of 175 segments.

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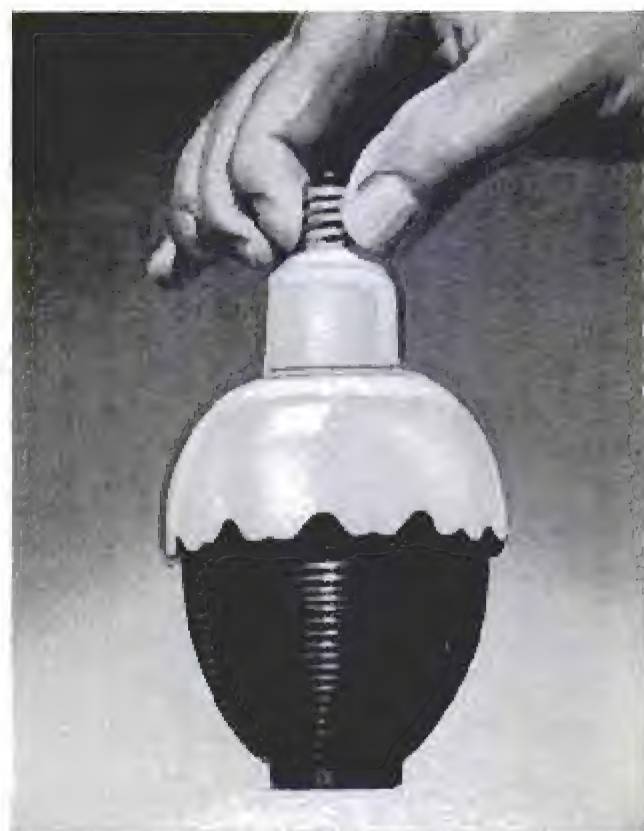
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Nickel May Control Wheat Rust

Botanists at the University of Manitoba, Can., report that tests with various metals indicate that a solution of nickel ions may help curb a wheat disease called stem rust. The disease is caused by a fungus. The scientists added that zinc also has a slight inhibitory effect on wheat rust when used at high concentrations.

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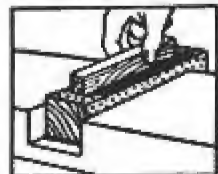
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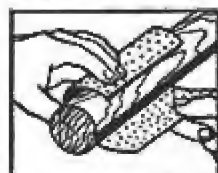
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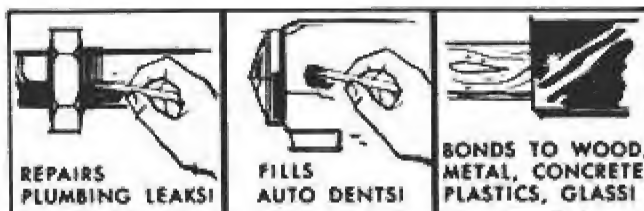
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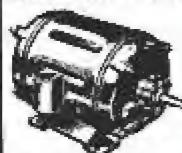
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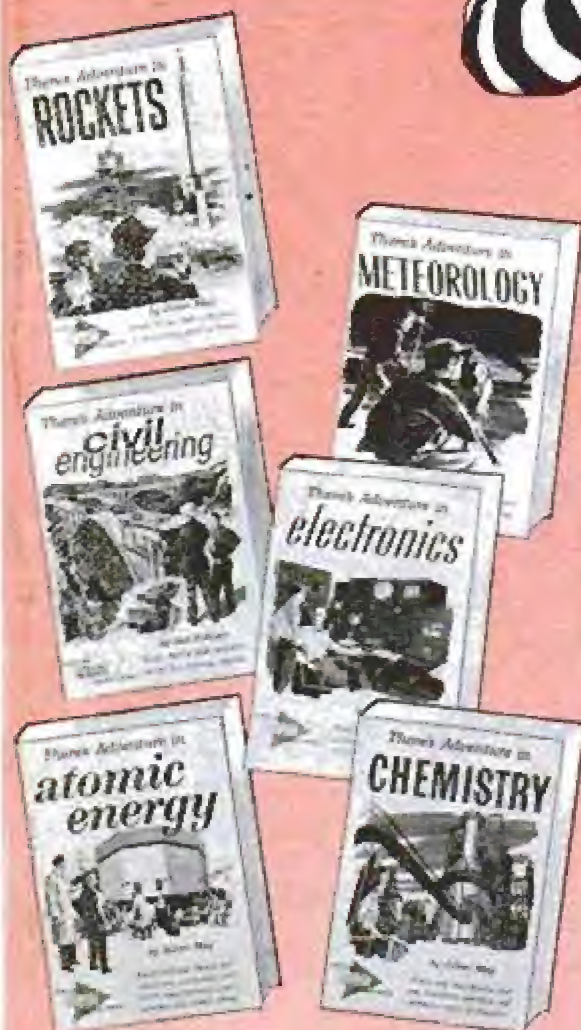
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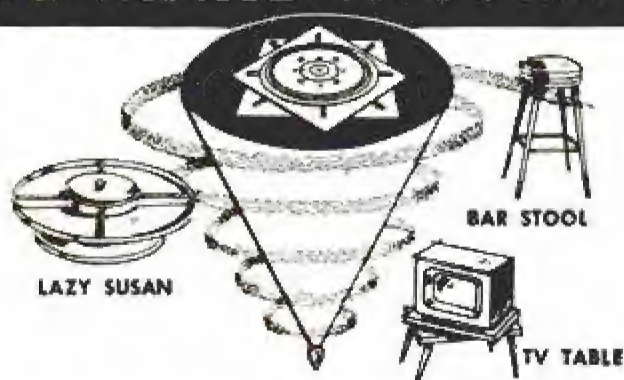
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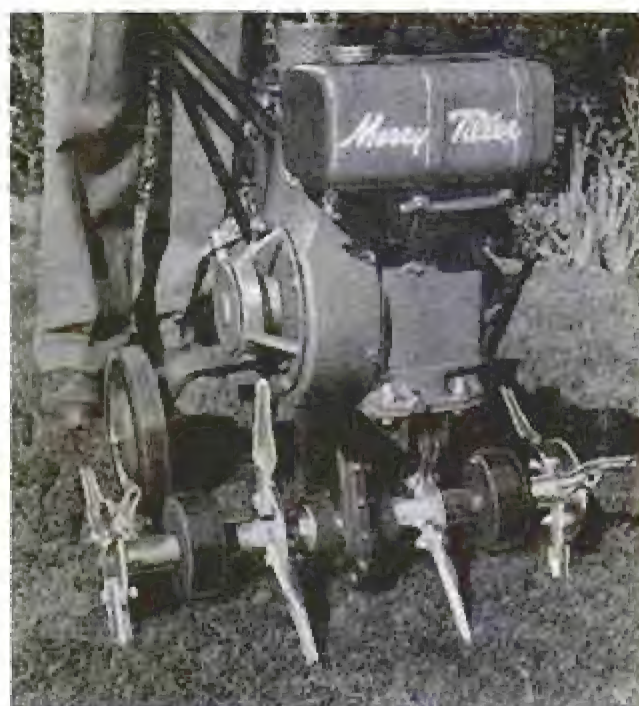
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Twelve steel spoons mounted on rotors and attached to a tiller-tractor shaft do the job of aerating the soil without disturbing the surface of a lawn. The aerifying spoons penetrate hard-packed layers of soil to a depth of 3½ inches, producing a greener and healthier lawn.

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Adhesive tape is being used on the wing and tail assemblies, interior panels and other structural parts of America's first prop-jet airliner, the Lockheed Electra. The bond created by the adhesive is said to be more permanent and durable than any other method of attachment. The metal parts are heated to 350 degrees and pressed together with the tape at a pressure of 100 pounds per square inch.

Telescope on Satellite Will Study Stars

Astronomers may put a telescope on an earth satellite to observe the stars from outside the masking of the earth's atmosphere. The telescope would focus radiation from stars so an electronic scanning device can provide an image of an area of the sky at a monitoring station on the ground. The space telescope would be operated by remote control.

☐ The Civil Aeronautics Administration forecasts 55 million U.S. air passengers for 1960 and 70 million for 1970.

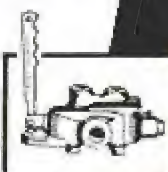
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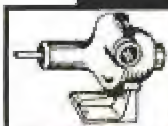
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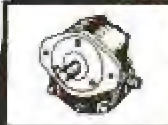


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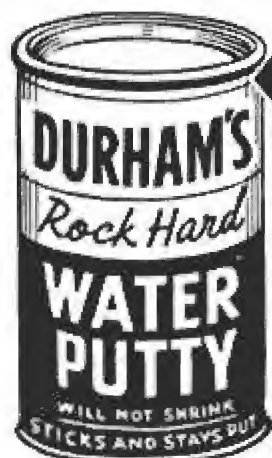
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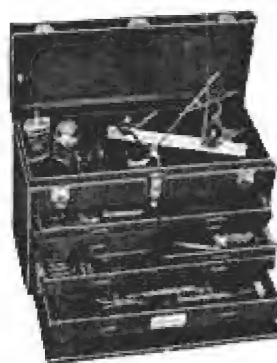


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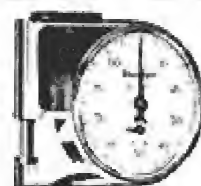
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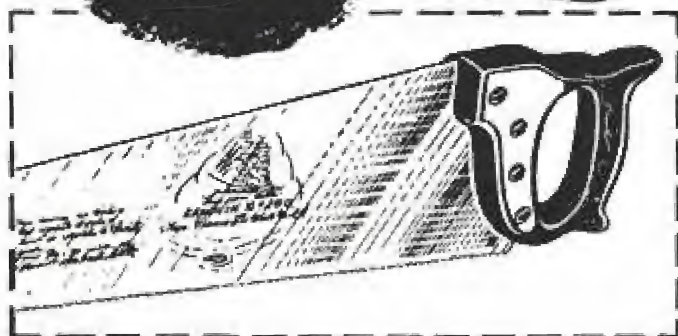
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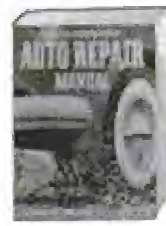
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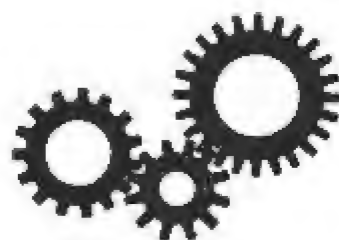
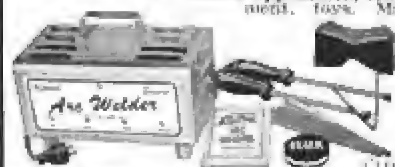
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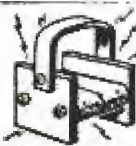
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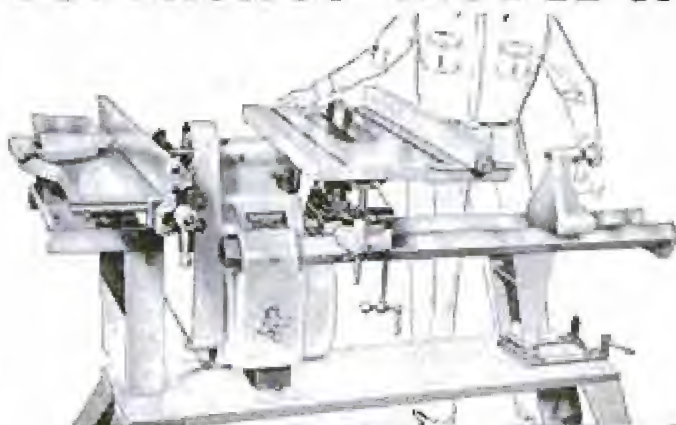


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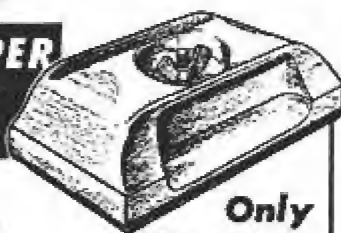


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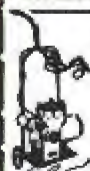
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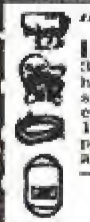
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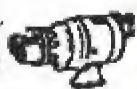
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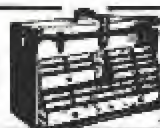
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Gives brilliant illumination for precise inspection of any material, substance or specimen. The head contains 1 large 50mm lens and has an internally calibrated scale to show relative size of subject. Metal body holds 2 flashlight batteries.

18 TO 1 ELECT. ACTUATOR

4.88
Motor turns at 9000 RPM through 18 to 1 gear box. Take-off shafts turn at 500 RPM and drive a ratchet type sprocket. Limit switches set length of travel. Makes an excellent ratchet hoist. Motor is 24 V. DC., S-I 2 A.

4 BUCKLE FELT LINED GALOSHES ONLY 2.98

Completely waterproof. A medium weight, all rubber gaiter. Mos extra warm felt lining. One piece tongue & 4 buckle closure. Sizes: 8, 9 and 10

U.S. NAVY FLEECE LINED COAT

Heavy cotton drill specially coated with plastic to make it weatherproof. Lined with a soft, warm sheepskin. Double breasted with a four button closure. Has two slash and two flap pockets. Sizes: 42 through 50. SAVE at . . . **19.95**

GENUINE B-15 FLIGHT JACKET ONLY 9.88

Regulation Air Corps type used by WAFS. Body is closely woven Mountain Clim. Has large Mountain Fur type collar. Full zipper. Knit cuffs & waistband. For Sportsmen & young men. In Size: Small. Color: Olive green.

U.S. ARMY MUKLUKS NOW 1.69

Keep the feet warm in the coldest weather. Made of waterproof canvas with felt inner soles. Has draw-strings at top, instep and ankles for snug fit. Sizes: Small, Meds, Large.

U.S. ARMY LIGHTWEIGHT PARKA 14.88

One-piece with hood attached. Has two extra large side pockets. 3/4 length with zipper and button-down storm flap. It's water repellent and wind resistant. Inner liner of soft fur pile. Sizes: Small, Meds, or Large.

WHITE ARMY SKI PARKA SPECIAL 3.95

Of white, water resistant twill. Slip-over style. Mos 3 buttons at neck and draw string adjust hood. Two slash openings allow access to undergarments. Sizes: Small, Medium or Large

MULTI-STREAM, SELF-CLEANING, ADJUSTABLE SHOWER HEAD

Just flip the lever to adjust the Multi-Stream head for an invigorating fine spray or a relaxing heavy shower. All brass with heavy Chrome finish. 7" head. **3.44**
Easy to install. \$6.98 VALUE! EACH 3 for Only 10.00

PALLEY HYDRAULIC BARGAINS

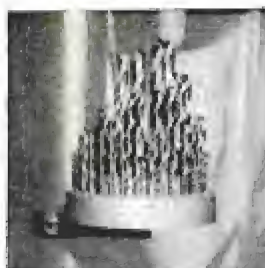
4-WAY VALVE No. H-V130SU 1500 PSI No. H-48

Piston type with built-in relief valve to limit stroke. Pressure balanced in neutral position with fluid return when not in use. Parts are 5.8" AC tube 7/8 x 18 threads. **7.88**
Dbl. Action HYDRAULIC CYLINDER Mos a 2" bore — 9" stroke — 7/8" shaft — 14-1/2" length. Another Palley Hydraulic Bargain. Approx. Gov't Cost . . . \$74 **5.95**
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SAVE! Order all 3 for \$8.95

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A once-in-a-lifetime find. Many were purchased by movie studios for westerns. We have a good supply left of old 11MM Caliber Remington single shot military rifles which have been stored for perhaps 50 years. The bores are clean and shootable. The guns are well preserved, not rusty and mechanically perfect with



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Earth Wobble at Poles Confirmed by Computers

High-speed electronic computers have confirmed an 80-year-old theory that the circular wobble of the earth's poles causes small ocean tides. Data for the last 100 years collected from the 11 tide stations in Europe, South America, the United States and the Indian Ocean were fed into the computer, which did the necessary 250 million mathematical computations in 1 1/2 hours. Interpretations of the computed data proved the existence of a polar-created tide, independent of the tides caused by the sun or moon.

Go South, Young Man

Twentieth-century pioneers willing to cope with primitive living conditions may find a prosperous future in a 2000-mile stretch of fertile valleys and plateaus of Colombia. A report published by the Smithsonian Institution says the partly explored region east of the Andean foothills, one of the world's last frontiers, produces bumper crops and may become a "new major source of food for the entire continent."

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Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off machinery and rust machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it! Built-in safety valve. Complete with 12 ft. of high-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$349.50** Special factory price.

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2000 lb. CAPACITY. A fortunate purchase from the Air Force enables us to offer these powerful 2000 lb. electric hoists at a fraction of their value. Perfect for material handling, boat hoists, elevators, lifts on assembly lines, etc. Two separate 22 ft. lift cables with independent controls permit leveling the load and controlling it perfectly. Rugged ball bearing motors & geared down design 110 volts. Available for A.C. or D.C. Please specify. Makes a terrific portable hoist with our 2275 L.C. light plant with our 2275 L.C. light plant at \$149.50. Hook not included. Wt. 145 lbs. A.C. Model, Item 847A. **\$149.50** D.C. Model, Item 847. **\$129.50**

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Sturdy ball bearing winch—super tough aluminum alloy construction. Powered by an easy starting 2 1/2 HP Briggs gas engine thru gear reduction drive—it exerts up to 3000 lbs. of terrific force for hoisting materials or pulling. Combination gear and pulley reduction for tremendous multiplication of engine power. Idle pulley clutch arrangement and built-in drum brake (with rate of hand lever) enables operator to ease loads down gently and lock at any point desired. Drum handles 400 ft. of 3/4" cable or 800 ft. of 1/2" cable. Ideal for contractors, farm implement trailers and unlimited other uses! (Item 795) Wt. 125 lbs. Only. **\$149.50** **HEAVY DUTY MODEL** same as above but with big Industrial Clutch. **\$169.50** **HAND WINCH**—Same winch with large crank handle for extra leverage and speed drive. (Item 794) Wt. 60 lbs. **\$59.50**

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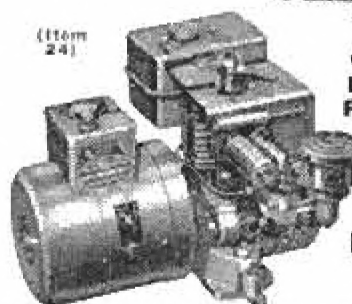
MINE DETECTOR for detecting buried pipes, wires, sewers, etc. Carrying case and fresh batteries included. **\$49.50** **AIR HAMMER** for hammering dents out of auto bodies. Complete with 2 different shaped arms and 5 bumping dollies. Hammer can also be used without arm for chiseling and drilling, etc. Uses 4 cfm at 60 psi. **\$39.50** **SCREW JACK**—16 ton Simpson Jack. 1 1/2" screw, 16" lift. Reg. price \$29.50. **\$9.50** Special Price **HYDRAULIC PRESS** 9 ton press for pushing, bending, straightening, etc. **\$69.50** 2400 Lbs. Special Price **SCREW PRESS** 9 ton capacity with 2 1/2" throat. Complete with adjustable table. **\$49.50** **EXTENSION CORD** 2 cond. # 4. Neoprene **\$6.95** 2 cond. # 10. Neoprene cover **\$7.95** **INTERCOM SET** Powerful loud talking intercom set powered by 4 flash light batteries which last for 4 months. Good up to 1,000 ft. Complete with 2 stations—250 ft. of wire and batteries. **\$11.95** **PORTABLE BLOWER** powered by 2.2 Briggs Gas engine. Used for ventilating man holes, tanks, or any ventilating purpose. Complete with 20 ft. of 4 in. flexible pipe. **\$99.50** **EXHAUST FANS**—Heavy duty, powered by sealed explosion proof motors, mounted in steel frames. Ideal for ventilating spray booths, barns, taverns, etc. **\$29.75** 20" fan only **FURNACE BLOWER** 10 in. wheel, handles 1800 CFM. Requires 1 1/2 HP motor. **\$29.50** Outlet size is 1 1/4" by 1 1/4"

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A powerful cylinder built by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs. with a 1000 PSI pump pressure. Cylinder is 3 1/2" i.d. with 6 1/2" stroke—standard heavy duty clevises on both ends. Has standard 1 1/2" pipe thread openings. Can be used for tilting buckets, blades, raising or lowering implements, hydraulic presses, etc. Can also be used as an air cylinder. (Item 802) Wt. 17 lbs. Reg. \$68 value. Special. **\$14.95**

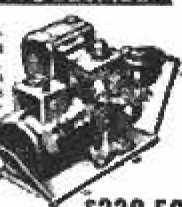
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We have all sizes of cylinders available. **HYDRAULIC CONTROL VALVE**—4 way open center valve with built-in adjustable relief. Controls 1 double, or 2 single acting cylinders. Equalizing feature permits easy control, even under heavy loads. 3/4" pipe thread on inlet & outlet. 1 1/2" on cylinder outlets. Easily mounted, finger tip control. Wt. 10 lbs. (Item 822) **\$21.95** **HYDRAULIC PUMP** drive from tractor power take off or with separate engine or motor. Capacity is 8 GPM at 800 RPM—has 3/4" shaft with keyway. **\$39.50** **HYDRAULIC HOSE COUPLERS** Connect or disconnect hydraulic lines without loss of oil. 1/2" pipe threads. (Item 819) per set **\$3.95**

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1750 Watt Plant Powered by 4 1/2 HP. engine. Electric starting & battery charging built-in! Factory price **\$279.50** **2500 WATT PLANT**—Push Button Start (Item 21) 110/120 v. 60 cye. A.C. A rugged powerful plant. Reg. \$445. Spec. **\$329.50** **3500 Watt Plant** Push Button Start (Item 23) 115 v. 60 cye. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$760. Factory Price. **\$379.50** **DUAL VOLTAGE** 110/220 for Item 21 or 23—\$30 additional.

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HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E) **\$11.95** 12" Fan, wt. 10 lbs. (Item 10D) **\$12.95**

HIGH SPEED BARN FAN similar to above, but larger, high speed motor moves huge volume of air. 12" Fan (Item 10G) **\$14.95** 14" Fan (Item 10H) **\$17.95**

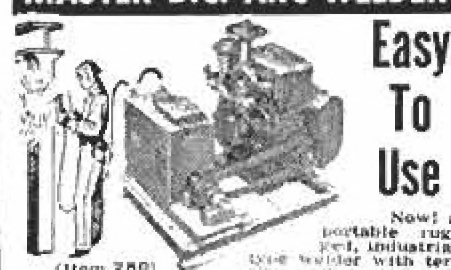
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1 1/4"x20'	10.95	2"x10'	9.50
1 1/4"x25'	13.95	2"x14'	21.50
1 1/2"x50'	24.95	2"x50'	47.50
1 1/2"x100'	49.95	2 1/2"x10'	21.75
1 1/2"x10'	10.95	2 1/2"x17'	37.50
1 1/2"x25'	14.75	3"x10'	25.50
Discharge Hose		4"x15'	44.95

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Easy To Use Now a portable rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Sinter model made for years of trouble-free, continuous service. High capacity D.C. welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. Easy to hook up and easy to operate. **WELDER ONLY — DUAL CONTROL MODEL**. Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 38a) Wt. 110 lbs. \$450 value **\$119.50** **WELDER ONLY — INDUSTRIAL MODEL** same as above but with ceramic rotary type rheostat providing 74 different heat settings for all types of welding (Item 38b) \$500.00 value. **\$139.50** **COMPLETE POWER MASTER** (Illustrated above) powered by a 16 hp. air cooled Wisconsin engine. Wt. 480 lbs. (Item 286) Compare with welder costing \$1200. **\$449.50** Factory Special.

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“Hottest” fishing news for '59!

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Tests proved all around superiority of Evinrude's new '59 “hot running” thermostat-controlled motors over standard engines. Now all 1959 Evinrudes from 5½ to 50 hp are thermostat-controlled and operate at a constant 140° temperature for peak efficiency at all speeds, all conditions.

Longer Spark Plug Life

In all motors tested, spark plugs lasted 3 to 7 times longer in the thermostat-controlled engines—dramatic evidence of the benefits of faster warm-up, unvarying temperature, and better lubrication.

Smoother Operation

Whether in icy waters in the North, or warm Southern waters, thermostat control gives the new '59 Evinrudes better idling, smoother full-range performance, permits closer engineering tolerances.

Extra Fuel Savings

Under identical operating conditions the thermostat-controlled motors used up to 20% less fuel—a practical demonstration of increased efficiency.

Less Rust and Salt Corrosion

The problems of salt corrosion or rust in bearings or cylinders caused by high humidity are licked by warmer, drier air under the covers.

Longer Engine Life

The 98 Evinrudes tested on the job by commercial fishermen were all run from 1500 to 1800 hours without major maintenance. Many of these fishermen were so impressed they wanted to buy the motor they had been trying to wear out. Longer engine life is a real economy for any fisherman.

The '59 Evinrudes are no “warmed-over” last year's models. They're new hot-blooded thermostat-controlled motors with increased performance.

See '59's finest motors at your Evinrude dealer (listed under “outboard motors” in your phone book). Ask for '59 catalog—or write: Evinrude Motors, 4374 North 27th Street, Milwaukee 16, Wisconsin.

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